5.00

TELE-SIGNAL

MODEL 883P

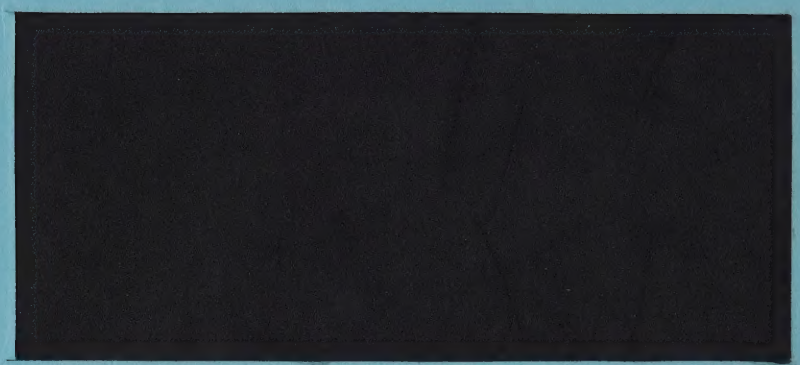
MODEM

ISSUE V

SINGER

AEROSPACE & MARINE SYSTEMS

250 CROSSWAYS PARK DRIVE
WOODBURY, LONG ISLAND, NEW YORK 11797
516/921-9400 TELEX 96-1468



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250 Crossways Park Drive
Woodbury, L. I., N. Y. 11797
516/921-9400 Telex: 96-1468

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STRAPPING PRECAUTIONARY SHEET

Note: Power is always to be disconnected before re-strapping any portion of this system.

Proprietary Information

INSTRUCTION MANUAL

MODEL 883P

INDEX

ILLUSTRATIONS

APPENDIX

1.0 PURPOSE AND BASIC PRINCPPLES

1.01 Scope of Manual

The purpose of this manual is to provide detailed information on the 883P Modem.

Detailed manuals of both printed circuit boards are included as appendages to this manual and could be referred to if additional detailed information is desired.

1.02 Description

1. An 883P Series Modem is a Bell 201A, 201B(as well as CCITT 2400 bps alternate A & B version)compatible, compact, desk-top styled, stand-alone unit suitable for computer room or office applications. It is approximately 8" wide by 14" deep and 3" high. The unit contains two printed circuit boards, 83PS and 83PR.

2. This Modem will operate synchronously at the following rates:

   2400 bps
   2000 bps
   1200 bps
   1000 bps

3. The 883P can operate two-wire half-duplex or four-wire full-duplex under control of strapping options. It will operate over the switched network or over leased lines.

4. The receiver offers such features as built-in optional compromise delay and slope equalization, strappable Echo Delay and New Sync..

5. The transmitter has features such as: Answer tone, manual or automatic control; full-or half-rate by switch or remote control.

6. A tone-line and data-line loop-back test feature is incorporated under control of a switch. (Described in detail in 4.04.)

7. The Modem will accommodate a Manual Data Access Arrangement such as the Bell CDT July 1970 version as well as an Automatic Data Coupler such as the Bell CBS August 1970 version (Bell 1001A), and can automatically answer and can optionally abort call for no initial carrier within 10 seconds, loss of carrier during transmission, or both. A manual call can be made on the CBS Automatic DAA, without restrapping, by manually dialing and then hanging up,thus transferring control to the Modem.

1.02 Description (cont'd)

8. The interface is in accordance with RS232C and includes fail-safe circuitry.

9. Plug-in type straps are employed for all options including output level adjustment.

10. The unit is normally strapped for 115 volt 50-60Hz and is restrappable for 230 volt operation.

11. Line Echo Suppressors may be automaticlly or manually disabled using a built-in feature.

12. When operating half-duplex over 2-wire lines, the receiver can monitor the transmit data thus providing home copy. This feature is under strap-option control.

1.03 Application

1. The mode of operation must be specified at the time of ordering. The unit will then be factory strapped and tested accordingly, therefore requiring no re-strapping upon installation except for transmit level and possibly delay equalization.

2. If field restrapping is required to accommodate a different mode of operation, extensive strapping information is provided in this manual.

2.0 SPECIFICATIONS

2.01 Electrical Characteristics (VF Signals)

1.	Input/Output Characteristics:	Transformer-coupled 2-wire half-duplex or 4-wire line full-duplex, 600 or 900 ohms ±5%, strappable.
2.	Carrier Frequencies:	201A - 1750 Hz 201B - 1800 Hz
3.	Output Level:	+6 to -14 dbm in 1 db steps, strappable, normally strapped for -10 dbm.
4.	Input Level:	0 to -43dbm
5.	Receive Sensitivity: (Carrier Detect)	-38 dbm fixed (2-wire) -43 dbm fixed (4-wire)
6.	Data Rate:	2400/2000/1200/1000 bps

2.02 Electrical Characteristics (EIA Connector Data & Control Signals)

1. Sense:

	Negative	Positive
Binary State	1	0
Signal Condition	Mark	Space
Function	Off	On

A negative is defined as a signal more negative than -3V measured at the interface. A positive is defined as a signal more positive than +3V measured at the interface.

2. Input Circuit Characteristics:

a.	Input Impedance:	3K to 7K ohms
b.	Open-Circuit Voltage:	2 volts maximum
c.	Shunt Capacitance:	Less than 2500 pf

3. Output Circuit Characteristics:

a.	Output Voltage:	±5V minimum
b.	Source Impedance:	Greater than 300 ohms
c.	Short-Circuit Current:	Less than 1/2 ampere, damage-proof

2.02 (Cont'd.)

4. Fail-Safe Features:

   a. The power-off source impedance of all drivers is greater than 300 ohms.

   b. The input terminators interpret a power-off condition or the disconnection of the interconnecting cable as an OFF condition, except for Data Signal Rate Selector (CH), Pin 23 EIA Connector.

5. Request-to-Send/Clear-to-Send Delay:

   5 milliseconds or
   7.5 milliseconds or
   20 milliseconds or
   150 milliseconds or
   0 delay

6. Echo Suppressor Disabling Tone:

   2025 Hz for 2.5 seconds Manual or automatic actuation.

7. Delay Xmitter Turnoff: The Xmitter will continue to xmit 2ms after Request-to-Send is turned off.

8. Echo Delay (Squelch):

   6 milliseconds or
   15 milliseconds or
   120 milliseconds

   (applicable for 2-wire mode operation only)

9. Carrier Detector: 5 millisecond response time.

2.03 External Connectors

1. EIA Connector: 25 Pin Cinch Jones DB-19604-433 or equivalent.

2. Data Coupler Connector: 14 Pin Terminal strip.

2.04 EIA Connector Interface

Circuit Description	CCITT V.24 Designation	EIA RS232C Designation	Pin No.
Protective Ground	Ckt 101	AA	1
Xmit Data	Ckt 103	BA	2
Rec. Data	Ckt 104	BB	3
Request-to-Send	Ckt 105	CA	4
Clear-to-Send	Ckt 106	CB	5
Data Set Ready	Ckt 107	CC	6
Signal Ground	Ckt 102	AB	7
Carrier Detector	Ckt 109	CF	8
Positive Voltage	For Test Purposes only		9
Negative Voltage	For Test Purposes only		10
Hook Switch Status	SH (from Coupler)		12
Coupler Cut Thru	CCT (from Coupler)		13
New Sync	From DTE		14
Serial Clock Xmit (SCT)	Ckt 114	DB	15
Dibit Clock Xmit (DCT)	To DTE		16
Serial Clock Rec (SCR)	Ckt 115	DD	17
Dibit Clock Rec (DCR)	To DTE		18
Data Access	DA (to Coupler)		19
Data Terminal Ready	Ckt 108.2	CD	20
Ring Indicator	(From Coupler) Ckt 125	CE	22
* Data Signal Rate Sel.	Ckt 111	CH	23
Serial Clock Xmit Ext. (SCTE)	Ckt 113	DA	24

* This feature is normally strapped out, see Para 4.01.

2.05 Data Coupler Interface (TB1)

Terminal No.	Application	Circuit Description	
2	Xmit pair 4-wire or Xmit/Rec pair for 2-wire	DT	Data Tip
3		DR	Data Ring
4	Rec pair 4 wire only	DT1	Data Tip 1
5		DR1	Data Ring 1
6	CBS DAA	SH	Hook Switch Status
7	CBS DAA	SG	Signal Ground
8			
9		B+	Positive Power (for test only)
10		B-	Negative Power)for test only)
11	CBS DAA	RI	Ring Indicator
12	CBS DAA	CCT	Coupler Cut Thru
14	CBS DAA	DA	Data Access
14	CBS DAA	OH	Off Hook

2.06 Environment

1. Operative Temperature Range:	$0^{o}C$ to $+50^{o}C$
2. Storage Temperature:	$-20^{o}C$ to $+70^{o}C$
3. Relative Humidity:	0 to 95% (without condensation)
4. Altitude Limits:	Operating: Up to 10,000 feet Non-Operating: Up to 50,000 feet
5. Fungus Resistance:	All materials are resistant to fungus growth.

2.07 Power Requirements

1. Power Consumption:	883P - nominally 8 watts
2. AC Voltage:	115VAC ±10% 50-60 Hz, restrappable for 220V operation.
3. Internal Voltages:	+12V, -12V, +5V regulated
4. External Fuse:	1/8 amp slo-blo, type 313.125

2.08 Physical Characteristics

1. Size:	8" x 14" x 3"
2. Weight:	Under seven pounds

2.09 External Controls

1. Mode Switch:	Operate AC-(VF loopback) DC-(DC loopback)
2. Speed:	HALF FULL/REMOTE
3. Echo Suppressor:	Disable

2.10 Internal Controls -

Normally set and sealed at factory, not to be adjusted in the field.

2.11 Recommended Line Conditioning

1. The Singer Model 883P is designed to operate at 2000 BPS over the dial up network and 2400 BPS over conditioned lines. The line requirements are as follows:

   2000 BPS 201A Modulation

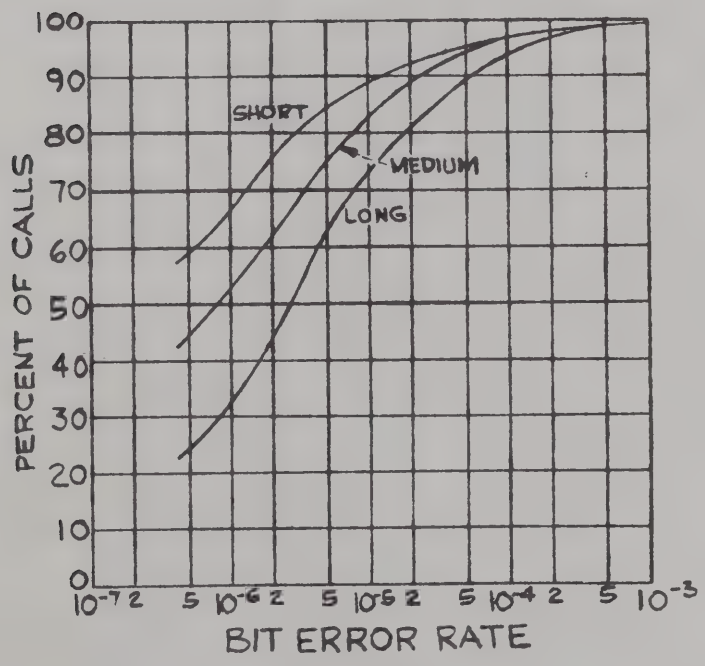
   Unconditioned Lines

   2001 Type Channel with C1 conditioning
   2001 Type Channel with C2 conditioning

   2400 BPS 201B Modulation

   2001 Type Channel with C2 conditioning

2. Satisfactory 2400 BPS operation is possible over the dial up network. As distances increase, the percentage of calls having an error rate better than a desired criterion decreases. An indication of this behavior is presented in the following curve for 2000 BPS operation over dial-up lines.



3.0 STRAP OPTIONS

3.01 Normal Strapping

The Modem is normally strapped in accordance with the customer configuration requirements as denoted on the Configuration Information Sheet at time of ordering. A copy of this sheet is included in the Appendix.

If the configuration information is not available at time of ordering, the unit will be strapped in the following manner:

83PS Board - B1, B2, B3, B4, BC1, BC2, AB, D2, K1, J, M, S, U, V, Z, 1-2, 3-4, 5-6

83PR Board - A2B3, A3B4, B1, B2C1, D, FF, H. J, P, Q, S, T, U, W, Y, ZZ

1. 201B Modulation - 2400 BPS
2. Four-Wire Full or Half Duplex
3. 7.5 Milli-second Clear to Send Interval
4. -10dbm transmit level
5. Equalizer strapped out
6. Manual DAA or leased line
7. Lamp Indicator on for Loss of Carrier

3.02 Restrapping Instructions

The unit is normally strapped in accordance with the customer configuration requirements. However, the boards can be re-strapped per the following table:

NOTE: To gain access to the boards, simply remove the four screws in the bottom of the unit. The outside cover will then slip off exposing the PC boards. The lower board is the 83PS and the upper board is the 83PR.

STANDARD OPERATING CONFIGURATIONS

A. Modulation/Speed

	83PS Board		83PR Board	
Function	Required	Forbidden	Required	Forbidden
201A Modulation (2000 BPS)	A1,A2,A3,A4 A5,A6,AB	D1	A1,A2B3 A3B4,R,X,Z	S,T,U,V B1
201B Modulation (2400 BPS)	B1,B2,B3,B4, BC1,BC2,AB	D1	Q,Y,W,S,T, U,B1,B2C1, A2B3,A3B4	V
CCITT Alt. A Modulation (2400 BPS)	B1,B2,B3, BC1,BC2,C1, C2	D1,	B1,Y,C2,S, T,U,C3,R,X, B2C1	V

B. Operation

Two-Wire Half Duplex	83PS Board	83PR Board
Features:	Required:	Required:
1. 150 Millisecond Clear To Send	D2,G,M1,J,K1, V, 1-2,3-4,5-6	K,P,GG,M,FF,ZZ
2. 120 Millisecond Receive Data Squelch	Forbidden:	Forbidden:
3. No Local Copy	E,Y,Z,H,H1,F	DD,EE
4. -10 dbm Transmit Level		
5. EQualizer Strapped OUt		

Four-Wire Full/Half Duplex	83PS Board	83PR Board
Features:	Required:	Required:
1. 7.5 Millisecond Clear To Send	D2,Z,K1,J,V, 1-2,3-4,5-6,	D,J,P,ZZ
2. -10dbm Transmit Level	Forbidden:	Forbidden:
3. Equalizer Strapped Out	E,G,H,H1,F,M1 M2	GG,M

C. Data Access Arrangement

Manual Type or Leased Line 600 ohms	No special strapping required except that P strap on 83PS Board must not be in.	
Automatic CBS Type 1001A	83PS Board	83PR Board
Features:	Required: P,L,S	Not applicable
No abort timer 600 ohms	Forbidden: X	

D. Lamp Indicator

	83PR Board
On for Loss of Receive Carrier	H
Off for Loss of Receive Carrier	G

3.03 Other Modes of Operation

The Singer Model 883P has a wide range of flexibility to accommodate various modes of operation. Many non-standard features are avilable by strap option. The rest of this section is devoted to provide further strapping information with regard to these options.

Transmit Level - 83PS Board

The transmit level is normally strapped for -10dbm into a 600 ohm load. The level can be changed in accordance with the following strapping table after removing Straps 1-2,3-4,5-6.

Desired Level

600 Ohms	900 Ohms	Straps
0 dbm	+2 dbm	None
-1 dbm	+1 dbm	1-3
-2 dbm	0 dbm	2-4
-3 dbm	-1 dbm	1-2, 4-5
-4 dbm	-2 dbm	1-3, 4-5
-5 dbm	-3 dbm	2-5
-6 dbm	-4 dbm	1-4, 4-5
-7 dbm	-5 dbm	1-2, 5-6
-8 dbm	-6 dbm	1-3, 5-6
-9 dbm	-7 dbm	3-4, 5-6
-10 dbm	-8 dbm	1-2, 3-4, 5-6
-11 dbm	-9 dbm	2-4, 5-6
-12 dbm	-10 dbm	1-4, 5-6
-13 dbm	-11 dbm	4-6
-14 dbm	-12 dbm	1-2, 4-6

For levels above 0 dbm, make strap F; this will raise the output level by 6 db.

600 Ohms	900 Ohms	Straps
+6 dbm	+8 dbm	None
+5 dbm	+7 dbm	1-3
+4 dbm	+6 dbm	2-4
+3 dbm	+5 dbm	1-2, 4-5
+2 dbm	+4 dbm	1-3, 4-5
+1 dbm	+3 dbm	2-5
+0 dbm	+2 dbm	1-4, 4-5

FUNCTION/STRAP CROSS REFERENCE

Function	83PS Board Required	83PS Board Forbidden	Co-Functioning 83PR Board Required	Co-Functioning 83PR Board Forbidden
201A Modulation	A1,A2,A3,A4, A5,A6,AB	D1	A1,A2B3, A3B4,R,X,Z	S,T,U,V, B1
201B Modulation	B1,B2,B3,B4, BC1,BC2,AB	D1	Q,Y,W,S,T, U,B1,B2C1, A2B3,A3B4	V
CCITT Alt A Modulation	B1,B2,B3, BC1,BC2,C1, C2	D1	B1,Y,C2,S, T,U,C3,R,X, B2C1	V
Clear-to-Send				
5 milli-sec	E	G,H,K,Y,Z		
7.5 milli-sec	Z	E,G,H,K		
20 milli-sec	Y	E,G,H,K		
150 milli-sec	G	E,H,K,Y,Z		
0 Delay	H			
Mark transmission during Request-to-Send Clear-to-Send interval	D2			
Two Wire Operation				
600 ohm	J		K	F
900 ohm	J		K	F
Four Wire Operation				
600 ohm	J,V		D,J	F
900 ohm	J,W		E,J	F
Carrier under control of Request TO Send	K1			

Function	83PS Board Required	83PS Board Forbidden	Co-Functioning 83PR Board Required	Co-Functioning 83PR Board Forbidden
Carrier Always On	K			
CBS DAA				
Abort Call upon absence of carrier within 10 secs after answering	L,P,R,U	X		F
Abort Call upon absence of carrier within 10 secs or later loss of carrier	L,P,R,T	X		F
No Abort features	L,P,S	X		F
Lamp on upon loss of carrier			H	
Lamp on upon presence of carrier			G	
Delay Equalizer				
Out			P	
Compromise Dial Up			NN	P
Nominal C2			N	P
Worst Case C2				P,N,NN
Receive Data Squelch				
(2 wire mode only)				
None				M
6 milli-secs			EE,M	FF
15 milli-secs			DD,M	FF
120 milli-secs			FF,M	DD,EE

Function	83PS Board Required	83PS Board Forbidden	Co-Functioning 83PR Board Required	Co-Functioning 83PR Board Forbidden
Two Wire Home Copy			M2	GG
No Home Copy			GG,M1	
Serial Clock Receive				
Mark Lockup upon loss of carrier			YY	
Space Lockup upon loss of carrier			ZZ	
Forced Half Rate Operation	D1		V	
Forced Clear to Send	H1			

3.04 Strap Functions

1. This section outlines the function performed by each strap. The following table should not be used to restrap the modem since Sections 3.01 to 3.03 is intended for this purpose. This information is provided only for reference purposes and as a guide to determine if a non-applicable strap is accidentally made.

83PS Board

AB	For both 201A and 201B modulation, this strap allows proper phase modulation of the carrier by routing one bit of the dibit to the proper input of the phase modulator.
A1,A2,A3	These straps control the timing cound-down chain so that the clock and carrier frequencies for the 201A mode of operation (2000Hz and 1750Hz respectively) are developed.
A4,A5,A6	These straps route the data bits within the digital phase modulator to provide proper carrier phase shift coding for the 201A mode.
B1,B2,B3	The timing countdown chain for the 201B mode of operation is derived by implementation of these straps resulting in clock and carrier frequencies of 2400Hz and 1800Hz respectively.
BC1,BC2,B4	These straps route the data bits for the required phase shift coding for the 201B mode. BC1 and BC2 are also required for the CCITT alternate A mode. However, B4 and AB must be removed for CCITT Alternate A.
C1,C2	These straps are installed upon removal of B4 and AB for CCITT Alternate A coding.
D1	Insertion of this strap forces the transmitter into the half-rate position.
D2	With this strap in, the modem is forced to transmit mark during the request-to-send clear-to-send interval. Upon removal, normal data can be transmitted during this interval.
E	Insertion forces a clear-to-send delay of 5 milliseconds. Z, Y, K, G & H should not be in.
F	Insertion of this strap increases the output level by 6dB.
G	Insertion of this strap forces a 150 millisecond clear-to-send interval. Straps H, E, Z & Y should not be in simultaneously.

3.04 Strap Functions (cont'd)

H	Insertion of this strap results in zero clear-to-send delay.
H1	Insertion of this strap forces clear-to-send high. Carrier is still under control of request-to-send.
J	The J strap must always be in. Removal of this strap will disconnect the transmit signal from the transmit filter input.
K	With K inserted, the carrier is forced on (independent of request-to-send). The clear-to-send circuit has its normal delay.
K1	With K1 inserted, normal operation of carrier control by request-to-send occurs.
L	This strap places the answer tone under control of coupler-cut-thru in the CBS DAA mode. P should be in simultaneously.
M	This strap places the answer-tone under control of the rear switch only. It should not be in for CBS operation.
M1	This strap triggers the squelch timer for two-wire operation where no local copy is desired.
M2	For local copy in the two-wire mode, this strap must be made.
P	This strap is inserted only for operation with a CBS automatic DAA. Insertion of the P strap inhibits Data Set Ready until coupler-cut-thru appears on the CBS interface.
R	Upon insertion of the R strap, the abort timer is enabled for use on the CBS DAA.
S	With the S strap in, the abort timer is disconnected.
T	If the T strap is inserted along with the R strap, the abort timer will terminate the call within 10 seconds after automatically answering and will also terminate upon later loss of carrier.
U	If the U strap is inserted along with the R strap, the call will be aborted if no carrier is received within 10 seconds after automatically answering with the CBS DAA.

3.04 Strap Functions (cont'd)

V	For 600 ohm output termination, this strap should be in.
W	The W strap should be in for 900 ohm terminating impedance.
X	With this strap in, Data terminal ready is forced on. This only has application for use with a CBS DAA, under special conditions.
Y	A 20 milli-second clear-to-send interval is generated. E, K, G and H should be out.
Z	A clear-to-send interval of 7.5 milli-seconds is generated. E, G and H should not be in.
1 thru 6	Transmit level adjust straps (see transmit level strapping Section 3.03).

83PR BOARD

A1	For 201A demodulation only, this strap provides a 1 milli-second delay within the demodulator delay line.
A2B3,A3B4	For both 201A and 201B demodulation, these straps route the proper delay line outputs to the product modulators.
B1	This strap is necessary for the 201B mode of operation. It provides a count-down-chain ratio for generation of regenerated received clock and data (2400 Hz and 2400 BPS respectively). Removal of this strap provides 201A rates.
B2C1	This strap provides a demodulator delay-line delay of 833 micro-seconds for 201B and CCITT alternate A demodulation.
C2,C3	For CCITT alternate A decoding, the proper delay-line outputs are routed to the product modulator inputs.
D	The D strap should be made for 600 ohm operation.
DD	If in the two wire mode and providing the M strap is made, a 15 milli-second squelch interval is provided by the DD strap. The FF strap should not be made.

3.04 Strap Functions (cont'd)

E	For 900 ohm operation, the E strap is required.
EE	When in the two-wire mode and if the M strap is made, the EE strap provides a receive-data squelch of 6 milli-seconds. The FF strap should not be made.
F	If this strap is inserted, Data Set Ready is forced on. This strap should only be made if an 83PR board is used to generate a receive only modem.
FF	With the FF strap in, the squelch interval is 120 milli-seconds. The DD or EE straps must not be concurrently in.
G	The G strap provides a lamp on condition only upon presence of received carrier.
GG	This strap inhibits home copy when request-to-send is high. It should only be used, if desired, in the two-wire mode of operation.
H	With the H strap in, the lamp is on only upon loss of received carrier.
J	This strap connects the receiver to the receive transformer for 4 wire operation.
K	This strap connects the receiver to DT and DR on TB1 through the transformer on the 83PS board. It should only be made for two-wire operation.
M	Installation of the M strap provides receive data squelch. It should only be implemented, if desired, in the two-wire mode of operation.
N	This strap sets the equalizer for a nominal C2 line. The P strap must not be simultaneously in.
NN	The NN strap provides delay equalization for a compromise dial-up condition. The P strap should not concurrently be inserted.
P	This strap, when inserted, by-passes the delay equalizer.

3.04 Strap Functions (cont'd)

Q	For 201B dibit decoding, the Q strap must be in. For this mode, the W and Y straps must concurrently be in.
R	This strap must be in only for 201A and CCITT alternate A dibit decoding.
S,T & U	These three straps, when inserted, provide timing recovery for 201B and CCITT Alternate A operation at 2400 BPS. When these straps are removed, the timing recovery is shifted to 201A, 2000 BPS operation.
S1	This strap allows normal operation of the receiver timing recovery circuit including coarse and fine corrections, as well as New Sync.
S2	This strap causes continuous coarse correction of the receiver timing; thus the receiver clock is essentially the same as the data derived clock. The New Sync feature is disabled.
V	Insertion of the V strap forces half-rate operation.
W	This strap routes one of the bits from the demodulated dibit for proper decoding for the 201B mode only. Straps Y and Q must be concurrently in to complete the 201B decoding in this area of circuitry.
X	This strap provides the proper bit decoding logic for both the 201A and the CCITT alternate A modes.
Y	For 201B and CCITT alternate A bit decoding, the Y strap provides the proper logic for the dibit decoding.
YY	With the YY strap in, the received serial clock is locked up in mark upon loss of carrier detect.
Z	This strap allows the proper decoding of the dibits for the 201A mode only. The X and R straps should simultaneously be in.
ZZ	With the ZZ strap in, upon loss of carrier detect, the received serial clock is locked up in space.

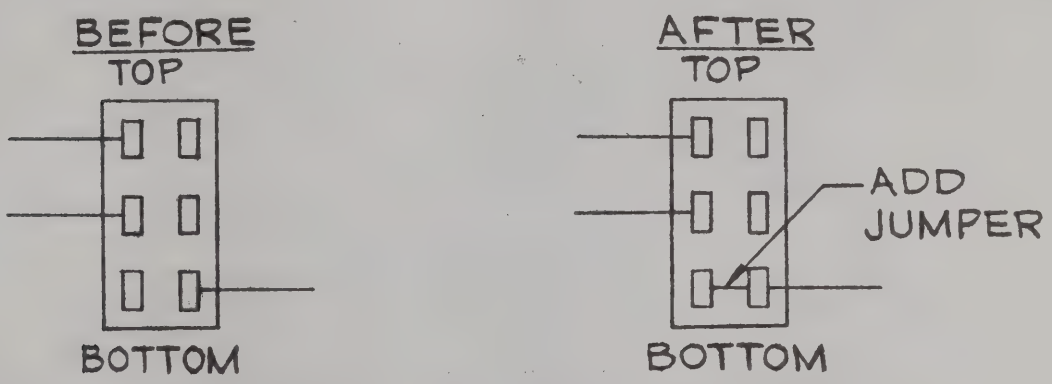
4.0 SWITCH FUNCTIONS & LOOPBACK TEST MODES

4.01 Speed Switch

1. In the "Full" position, the data rate is either 2400 BPS for 201B strapping or 2000 BPS for 201A operation.

   In the "Half" position, the data rate becomes 1200 BPS or 1000 BPS respectively. The modulation changes to di-phase from quad-phase which offers improved performance over marginal telephone lines.

2. The Full/Half rate functions can be controlled remotely via Pin 23 of the EIA interface by first performing the following strapping. The Full/Half switch must be in the Full position.



INSIDE VIEW OF FULL/HALF SWITCH

4.02 Echo Suppressor Disable Button

Momentary closure of this switch will generate a 2.5 second 2025Hz tone.

4.03 Mode Switch

There are three positions:

1. OPR - Normal Operate Mode
2. AC - VF Loopback Mode
3. DC - Data Loopback Mode

4.04 Loopback Modes

AC Mode

This mode is applicable under four-wire operation. In the AC position, the two receive and transmit pairs are paralleled at the telephone interface, thus bypassing the modem.

Simultaneously, the two modem receive and transmit pairs are paralleled, thus bypassing the telephone line.

Data Set Ready is forced off, therefore indicating a test mode to the equipment.

Figure 1 illustrates this mode of operation.

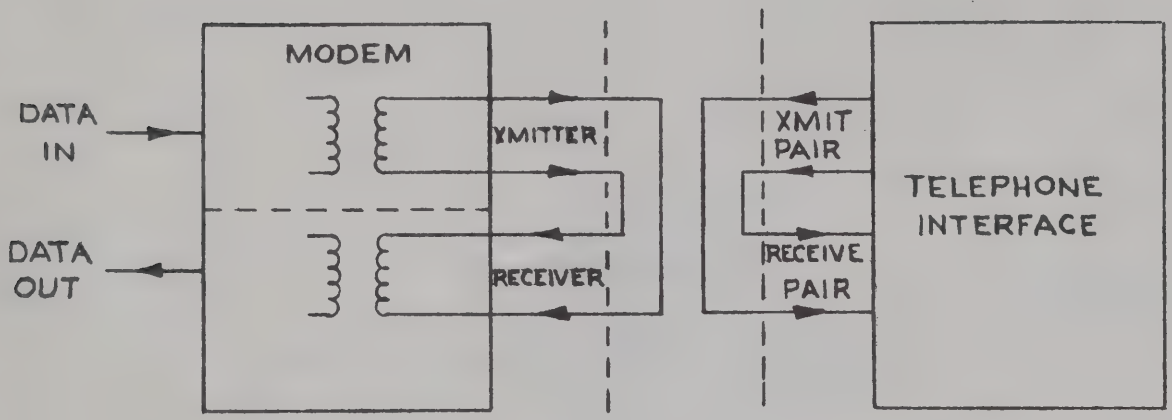


Figure 1

The telephone lines can therefore be tested from the remote end.

Simultaneously, the modem can be tested in a back-to-back mode of operation from the Data Terminal end.

In the 2-wire mode of operation the AC mode will force home-copy independent of whether the unit is strapped for home-copy, thus allowing a back-to-back modem test.

4.04 Loopback Modes (cont'd)

DC Mode

This mode is also applicable under four-wire operation. In the DC position the DATA IN (BA) from the equipment is looped back to the RECEIVED DATA OUT (BB) line going to the equipment.

Simultaneously, the received demodulated data is looped back to the transmitter and re-transmitted.

Data Set Ready is forced off, therefore indicating a test mode to the equipment.

The serial clock xmit external lead input is switched from EIA Pin 24 to the SCR lead of the receiver.

This method of operation is illustrated in Figure 2.

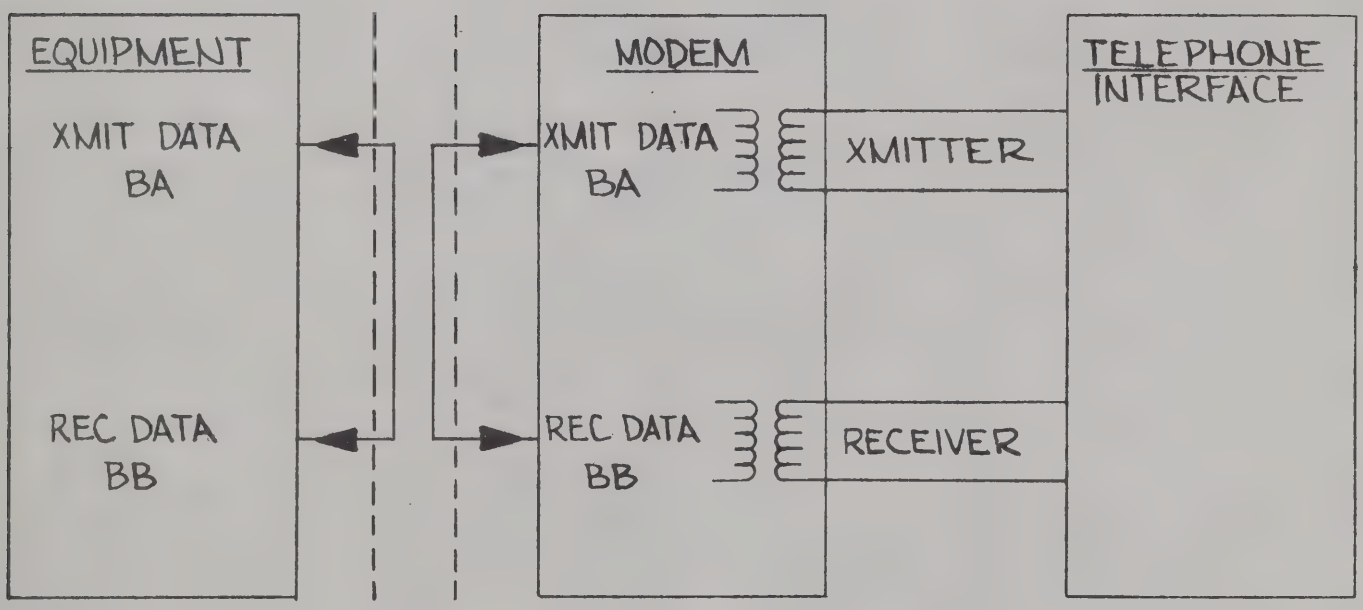


Figure 2

This allows testing of the modem and telephone lines from the distant end while simultaneously bypassing the modem from the equipment side.

5.0 INSTALLATION INSTRUCTIONS

5.01 Strapping

1. Determine transmit level required by DAA and restrap in accordance with Paragraph 3.03.

2. The Delay Equalizer is normally strapped out. In accordance with Paragraph 6.03, restrap the Equalizer if necessary.

3. In accordance with Paragraph 3.0, determine if additional restrapping is required to accommodate the environment.

5.02 EIA Connector

Connect properly wired mating connector (Cinch Jones DB-19604-432) to the unit's EIA Equipment Connector.

5.03 Manual Data Coupler

Connect Data Coupler to TB1 Interface.

For two-wire operation, use Pin 2 and Pin 3 as the VF tone line.

For four-wire operation, use Pin 2 and Pin 3 as the transmit pair and use Pin 4 and Pin 5 as the receive pair.

5.04 Automatic Data Coupler

Make the following connections from the CBS DAA to TB1 on the rear of the unit for the Automatic Answer Mode.

CBS	TB1 Pin No.	
DT	2	
DR	3	
SH	6	
SG	7	
RI	11	
CCT	12	
DA	14	DA & OH can be paralleled either
OH	14	on TB1 or the DAA.

5.05 Switch Positions

For normal operation, the mode switch should be in the OPR mode. The slide switch should be in either the half or full/remote position as desired.

6.0 APPENDIX

6.01 Modulation

The following table indicates the differential phase shifts incurred for the various data inputs. Note that for the half-rate options, di-phase rather than quad-phase modulation is used.

Dibit		Mode	Head-to-Head[1] Phase Shift	Tail-to-Head[2] Phase Shift	Carrier Frequency	Average[3] Frequency
1st Bit	2nd Bit					
0	0	201A	+225°	+315°	1750 Hz	2625 Hz
		201B	+225°	+45°	1800 Hz	1950 Hz
		CCITT	+180°	0°	1800 Hz	1800 Hz
0	1	201A	+315°	+45°	1750 Hz	1875 Hz
		201B	+315°	+135°	1800 Hz	2250 Hz
		CCITT	+90°	+270°	1800 Hz	2700 Hz
1	1	201A	+45°	+135°	1750 Hz	2125 Hz
		201B	+45°	+225°	1800 Hz	2550 Hz
		CCITT	0°	+180°	1800 Hz	2400 Hz
1	0	201A	+135°	+225°	1750 Hz	2375 Hz
		201B	+135°	+315°	1800 Hz	2850 Hz
		CCITT	+270°	+90°	1800 Hz	2100 Hz
Bit		Half Rate				
0		201A	0°	+90°	1750 Hz	2000 Hz
		201B	+180°	+90°	1800 Hz	2100 Hz
		CCITT	+180°	+90°	1800 Hz	2100 Hz
1		201A	+180°	+270°	1750 Hz	2500 Hz
		201B	0°	+270°	1800 Hz	2700 Hz
		CCITT	0°	+270°	1800 Hz	2700 Hz

1. Also known as epoch angle.
2. Also known as transition angle.
3. Measured at TP3 on the 83PS board using a high-frequency counter.

6.02 Error Rate

Error Rate measurements were made in a laboratory environment using a 2047 bit pseudo-random pattern at a baud rate of 2400 BPS. Gaussian noise, band-limited to 3000Hz, was introduced. The results are indicated in Figure 3.

6.03 Use of Compromise Equalizer

The unit is normally strapped so that the equalizer is out. Paragraph 5.02 indicates recommended strapping for dial-up as well as C2-conditioned lines. The delay and amplitude variations of conditioned lines is guaranteed to be within certain limits. However, the actual behavior is somewhat unpredictable since the line delay and amplitude vs frequency will vary in a random manner. In order to achieve the best possible performance, it may sometimes be advisable to try equalizer strap options other than the recommended.

For C1 lines as well as 3002 unconditioned, the C2-worst-case strap option will usually offer the best performance.

6.04 Use of New Sync

The New Sync feature allows rapid synchronization of the receiver to a new message. During the application of new sync a number of internal circuits are initialized so that the modem is conditioned to receive a new message any time after termination of New Sync. The New Sync pulse should have a minimum width of one millisecond and must occur between messages. If the time between messages is more than 10 milliseconds, New Sync is not required.

Figure 4 illustrates operation with and without the New Sync feature.

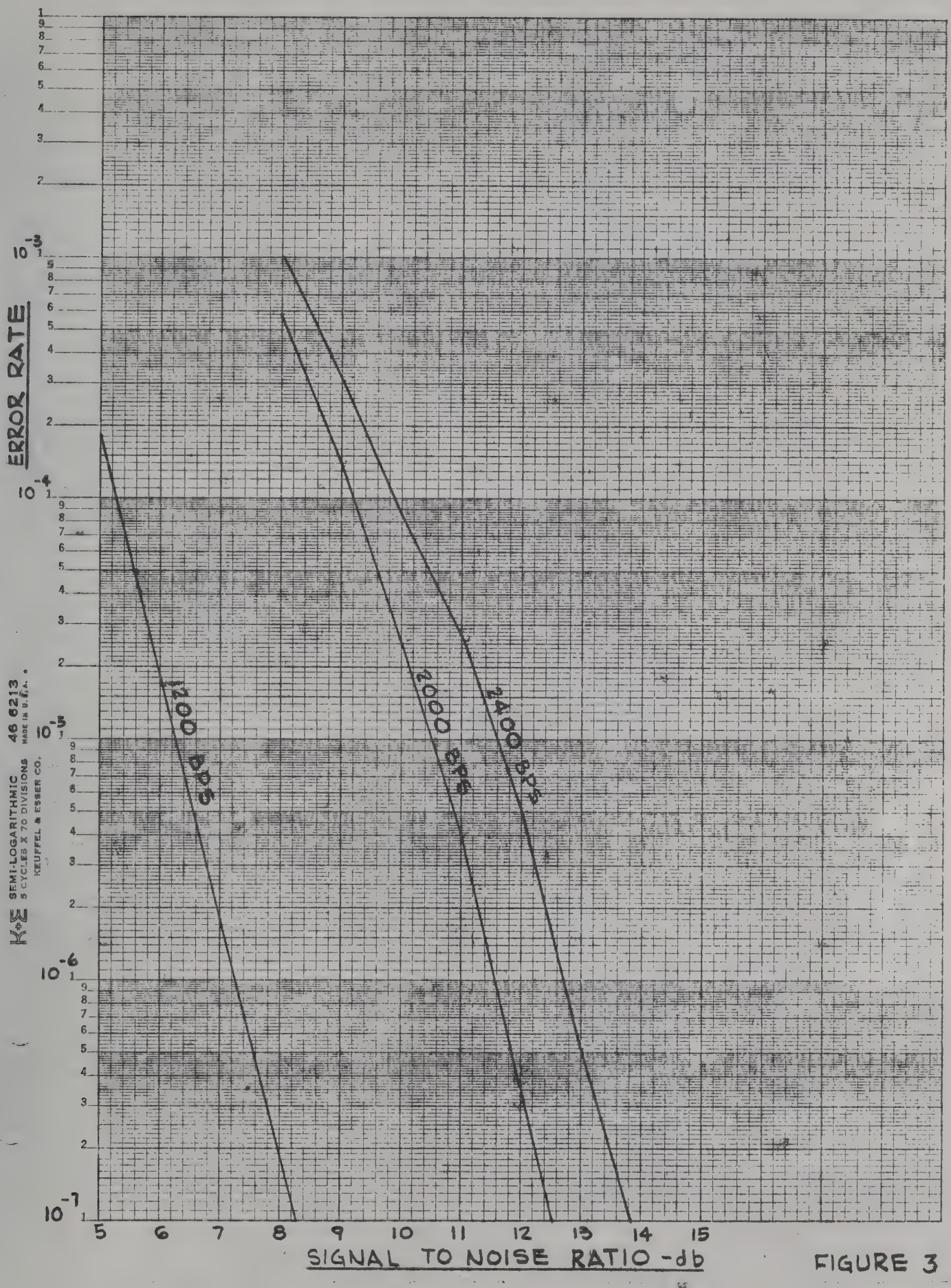
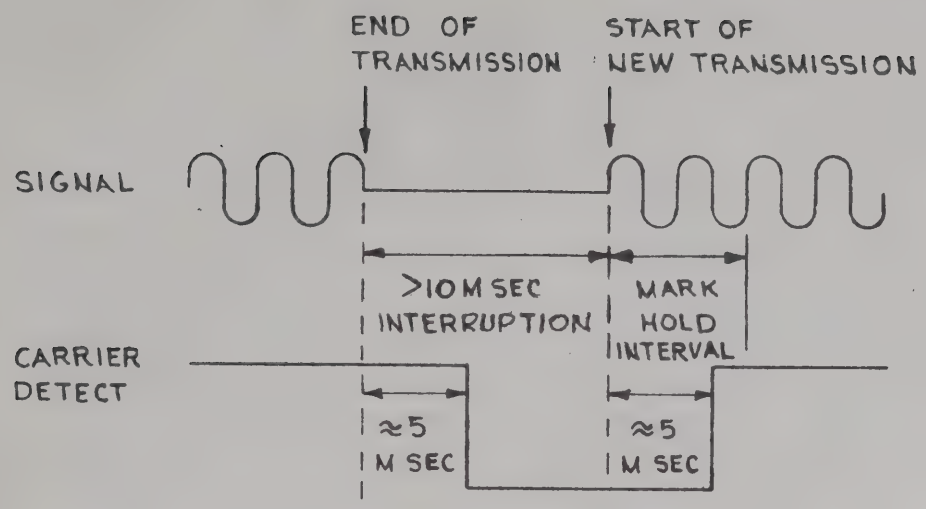
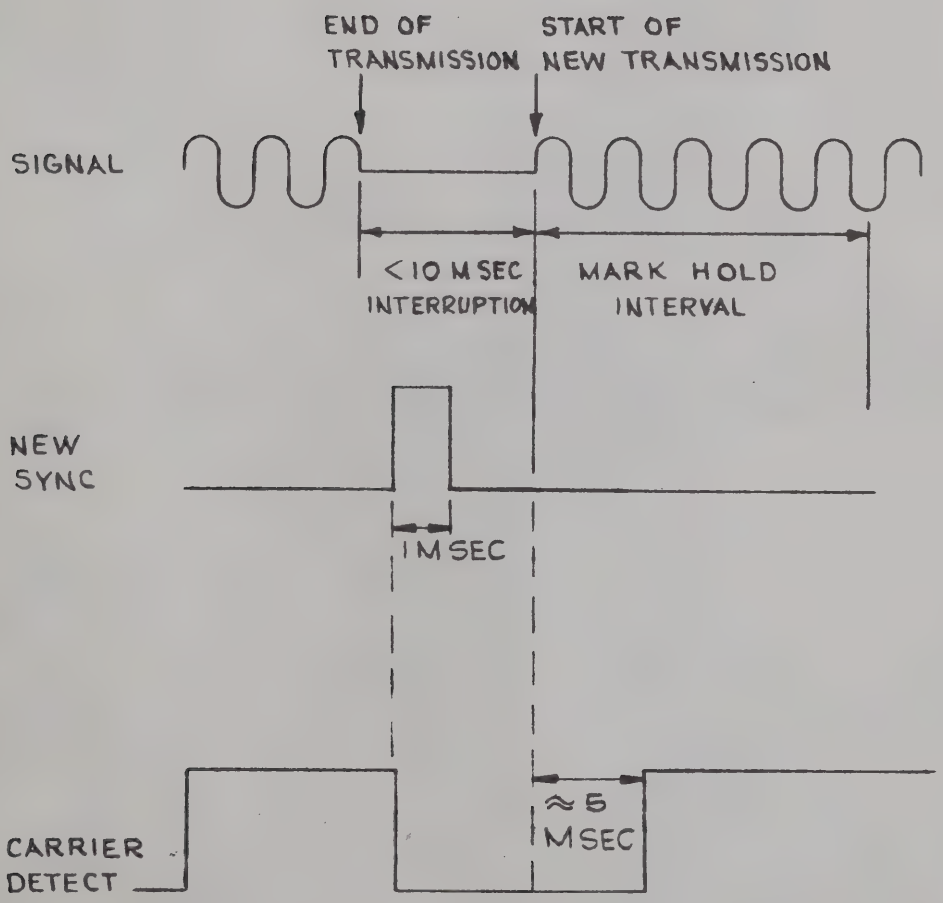

ERROR RATE
10^{-3}
10^{-4}
10^{-5}
10^{-6}
10^{-7}
1200 BPS
2000 BPS
2400 BPS
5 6 7 8 9 10 11 12 13 14 15
SIGNAL TO NOISE RATIO -db
SEMI-LOGARITHMIC
5 CYCLES X 70 DIVISIONS
KEUFFEL & ESSER CO.
46 6213
MADE IN U.S.A.

FIGURE 3



NORMAL OPERATION

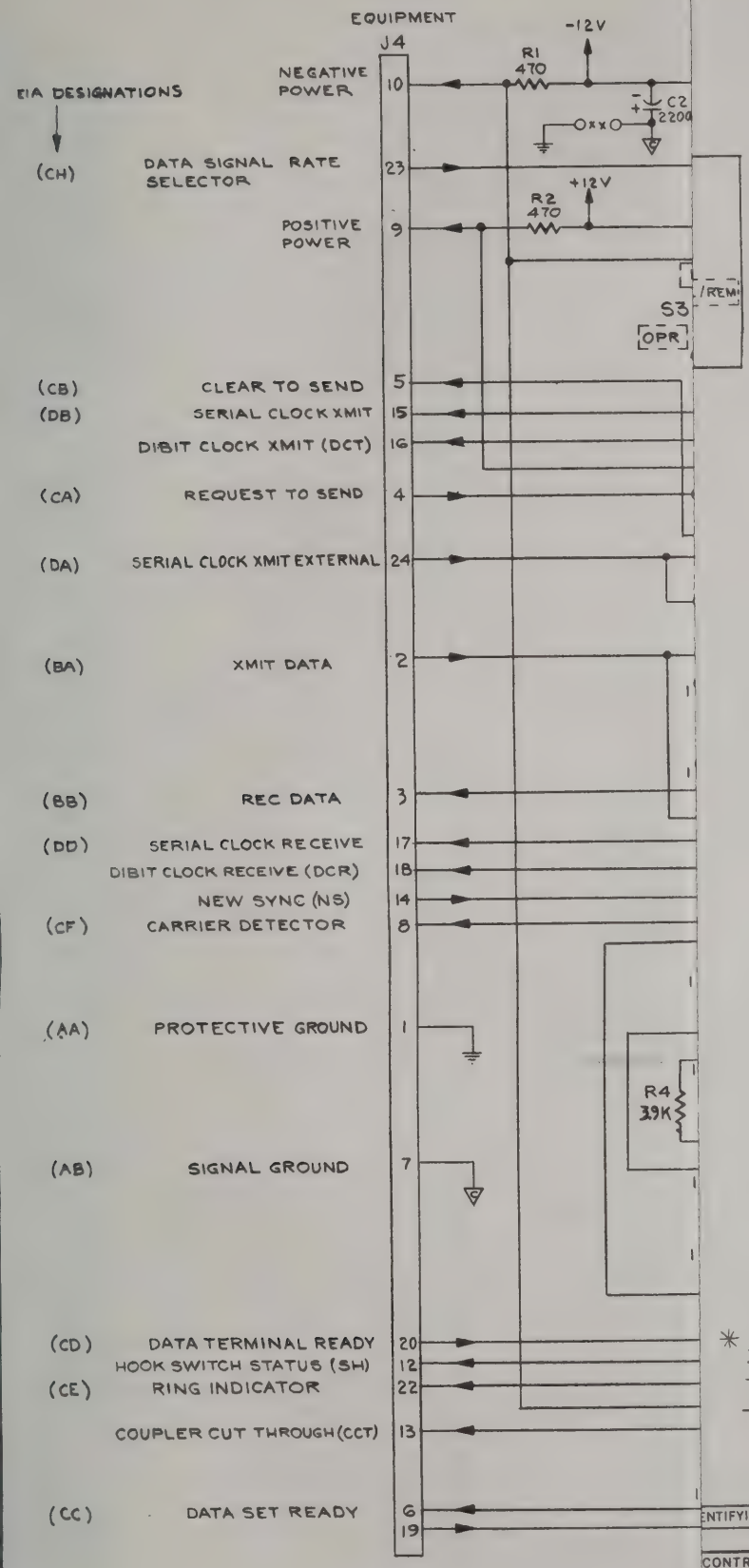


USE OF NEW SYNC

FIGURE 4

8 | 7

A ORIGINAL SYMBOL	REVISIONS			
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	B	F1 WAS 1/8 AMP. ECN 1758	11-12-71	
	C	CHANGED PER ECN #1870 J.F	3-24-72	
D,5	D	WAS 1/8 SLO BLO ECN #2173	1-29-73	
A,1	E	ADDED INACTIVE NOTE ECN #2204	3-12-73	



* INACTIVE FOR NEW DESIGN — SEE Y210T061. THIS DOCUMENT IS NOT SUPERSEDED FOR EXISTING APPLICATIONS.

ENTIFYING NUMBER	SPECIFICATION	NOMENCLATURE OR DESCRIPTION	REMARKS

PARTS LIST

CONTRACT NO.

DATE

PREPARED	J.J. TODD	2-23-71
CHECKED		
ENGINEER		6-7-71

SINGER
TELE-SIGNAL CORPORATION
WOODBURY, N.Y.

SCHEMATIC
DATA MODEM
883P 2400/2000/1200/1000

SIZE	CODE IDENT NO.	DRAWING NO.	REV
D	10241	883P -01	E

SCALE NONE | SHEET 1 OF 1

A ORIGINAL SYMBOL	REVISIONS			
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	B	F1 WAS 1/8 AMP. ECN 1758	11-12-71	
	C	CHANGED PER ECN #1870 J.F	3-29-72	
D,5	D	WAS 1/8 SLO BLO ECN #2173	1-29-73	
A,1	E	ADDED INACTIVE NOTE ECN #2204	3-12-73	

EQUIPMENT J4

EIA DESIGNATIONS

	NEGATIVE POWER	10
(CH)	DATA SIGNAL RATE SELECTOR	23
	POSITIVE POWER	9
(CB)	CLEAR TO SEND	5
(DB)	SERIAL CLOCK XMIT	15
	DIBIT CLOCK XMIT (DCT)	16
(CA)	REQUEST TO SEND	4
(DA)	SERIAL CLOCK XMIT EXTERNAL	24
(BA)	XMIT DATA	2
(BB)	REC DATA	3
(DD)	SERIAL CLOCK RECEIVE	17
	DIBIT CLOCK RECEIVE (DCR)	18
	NEW SYNC (NS)	14
(CF)	CARRIER DETECTOR	8
(AA)	PROTECTIVE GROUND	1
(AB)	SIGNAL GROUND	7
(CD)	DATA TERMINAL READY	20
	HOOK SWITCH STATUS (SH)	12
(CE)	RING INDICATOR	22
	COUPLER CUT THROUGH (CCT)	13
(CC)	DATA SET READY	6
		19

-12V, R1 470, C2 2200 uf, CR1, T1 XF10046, F1 XF1 .25 SLO BLO, P1 AC INPUT 000 555 999

+12V, R2 470, R3 3W 10, VR1 LM309K, +5V

MODE S3 AC OPR DC, C1 2200 uf

A1 83PS QUAD PHASE TRANSMITTER

OH RI SCT DCT CD BA CA CB DA CCT CC DR DT

+5V +12V -12V, J1, HALF, BIT RATE, S1 FULL/REM, SPEED

S2 ECHO SUPP. DISABLE

SH, BB LOCK RELEASE, 2MS, CA, REC TONE LINE, CF (TTL), CF INHIBIT

A2 83PR QUAD PHASE RECEIVER

BB SCR DCR NS CF LAMP CONTROL

DTI DRI CC, TO LAMP, DS1 XDS1 -12V

R4 39K

TBI: 1 NEGATIVE POWER, 10 RT RING INDICATOR, 11 SH HOOK SWITCH STATUS, 6 CCT COUPLER CUT THRU, 12, 13, 9 POSITIVE POWER, 14 QH DA, 7 SG SIGNAL GROUND, 2 DT, 3 DR, 4 DTI, 5 DRI, 8

* INACTIVE FOR NEW DESIGN — SEE Y210TOG 2. THIS DOCUMENT IS NOT SUPERSEDED FOR EXISTING APPLICATIONS.

ITEM OR FIND NO.	QTY REQD	CODE IDENT NO.	PART OR IDENTIFYING NUMBER	SPECIFICATION	NOMENCLATURE OR DESCRIPTION	REMARKS

PARTS LIST

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCE ON FRACTIONS ±
ANGLES ±
3 PLACE DECIMALS ±
2 PLACE DECIMALS ±

MATERIAL:

CONTRACT NO.

DATE

PREPARED	J.J. TODD	2-25-71
CHECKED		
ENGINEER	BBG MM	6-7-71

SINGER
TELE-SIGNAL CORPORATION
WOODBURY, N.Y.

SCHEMATIC
DATA MODEM
883P 2400/2000/1200/1000

SIZE	CODE IDENT NO.	DRAWING NO.	REV
D	10241	883P -01	E

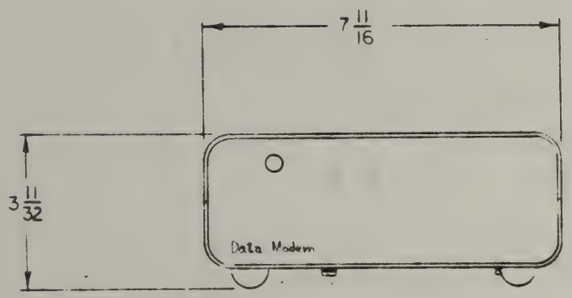
SCALE NONE SHEET 1 OF 1

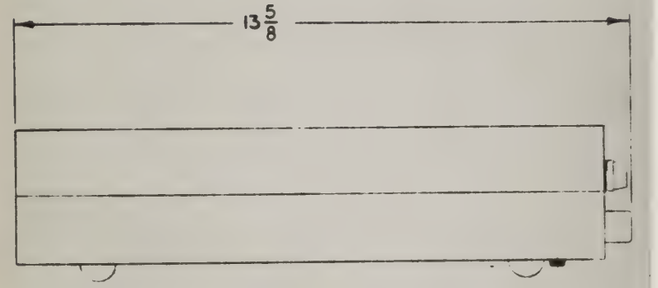
883P-01


REVISIONS
DESCRIPTION
DATE
APPROVAL
D
C
B
A
3 11/32
FOLD
CRIPTION
MATERIAL
QTY.
MATERIAL
RAWING
MODEM
3P
SINGER
TELE-SIGNAL CORPORATION
WOODBURY, N.Y.
C
883P-03
DWG. SIZE
SHEET
OF

DRAWING NUMBER	REV
883P-03	A

A ORIGINAL SYMBOL	REVISIONS		
SYM.	DESCRIPTION	DATE	APPROVAL





ITEM	QTY.	PART NUMBER	DESCRIPTION	MATERIAL	QTY.

LIST OF MATERIAL

QTY	USED ON	USED ON	QTY

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON:
FRACTIONS ±1/64 DECIMALS ±.010 ANGLES ±0°30

MATERIAL

FINISH

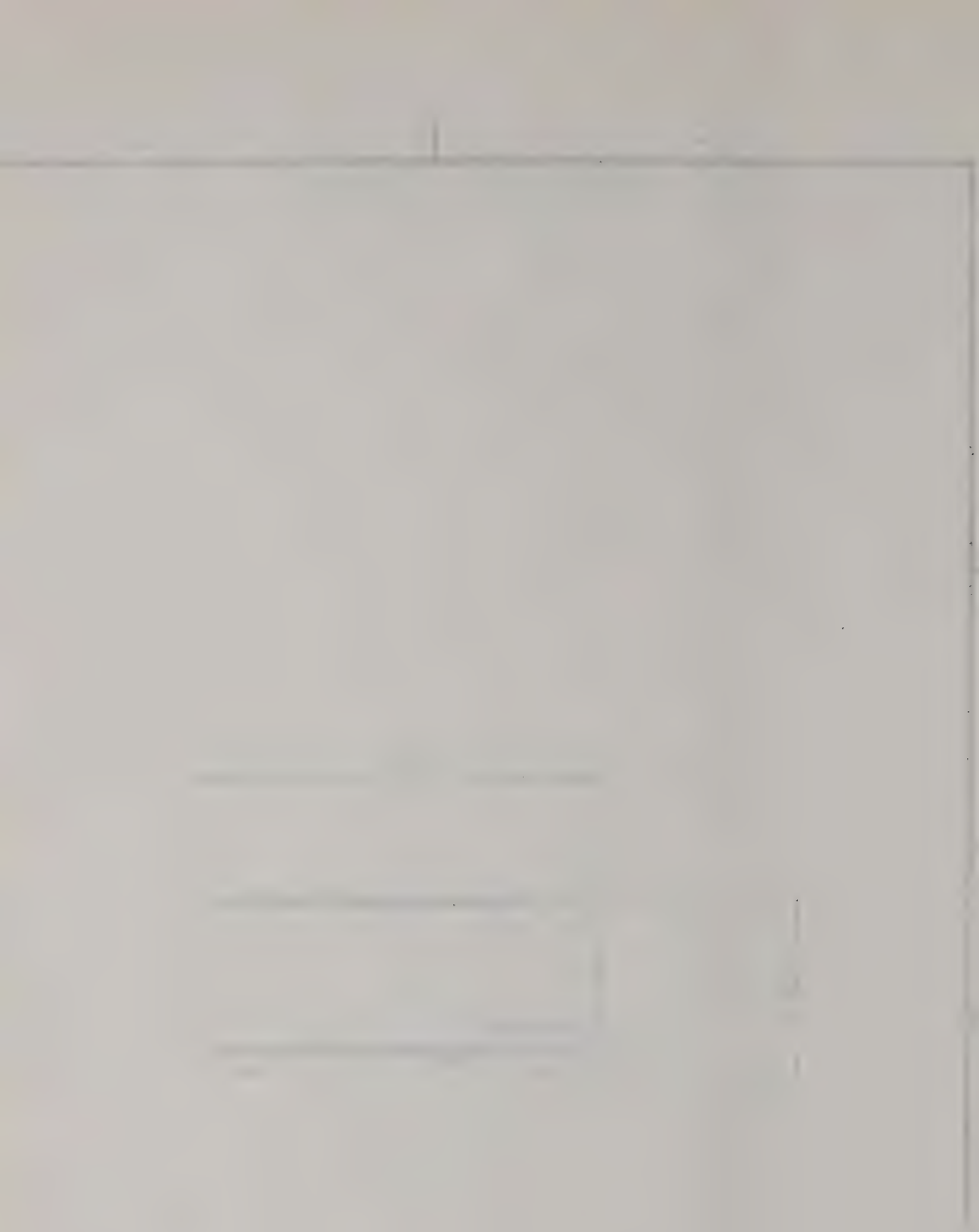
SIGNATURE		DATE
DRAWN	J.J.TODD	2-18-71
CHKD.		
MECH. APPVL.		
ELECT. APPVL.	[illegible]	6-7-71
STD		
APPD	[illegible]	6-7-71

OUTLINE DRAWING
TELE DATA MODEM
MODEL 883P

SCALE —

SINGER
TELE-SIGNAL CORPORATION
WOODBURY, N.Y.

C DWG SIZE | 883P-03 | SHEET 1 OF 1



MODEL 83PS

MODEM

INSTRUCTION MANUAL

ISSUE II

SINGER

Tele-Signal
Electronic Products Division

250 Crossways Park Drive
Woodbury, New York 11797
(516) 921-9400

Proprietary Information

INSTRUCTION MANUAL

MODEL 83PS

INDEX

1.0 PURPOSE AND BASIC PRINCIPLES

1.01 Description

1. The 83PS is a four-phase-modulation synchronous Transmitter on a printed circuit board approximately 4 5/8" wide, 11" long and 5/8" high. A 44 pin connector (Amphenol 225-22221-101 or equivalent) is required for mating.

2. The unit is designed to be compatible with a Bell 201A, 201B or CCITT V.26 alternate A & B. The interface is in accordance with RS232C.

3. External power of +12 volts, -12 volts and +5 volts is required.

4. The Modem will accommodate a Manual Data Access Arrangement such as the Bell CDT July 1970 version as well as an Automatic Data Coupler such as the Bell CBS August 1970 version (Bell 1001A), and can automatically answer and can optionally abort call for no initial carrier within 10 seconds, loss of carrier during transmission, or both. This abort timer is applicable in conjunction with a 83PR board in an 883P Modem. A manual call can be made on the CBS Automatic DAA, without restrapping, by manually dialing and then hanging up, thus transferring control to the Modem.

5. The transmitter also features the capability of disabling Echo-Suppressors by transmitting a 2.5 second burst of 2025 Hz.

6. All straps are of the plug-in variety. The output level is adjustable by strap. No soldering or monitoring is required (in case of an emergency, a standard staple can be employed as a strap).

1.02 Application

The unit is intended for use over the switched network or over leased lines at rates of 2400, 2000, 1200 or 1000 BPS. all synchronous. When strapped for 2400 or 2000 BPS, the transmitter can be switched to half-rate.

2.0 SPECIFICATIONS

2.01 Electrical Characteristics (VF Signals)

1. Input/Output Characteristics:	Transformer-coupled 2-wire half duplex or 4-wire full duplex, 600 or 900 ohms ±5% strappable.
2. Output Level:	+6 to -14 dbm in 1 db steps, strappable. Normally strapped for -10 dbm.
3. Carrier Frequencies:	201A 1750 Hz 201B 1800 Hz CCITT V.26 1800 Hz Ans. Tone 2025 Hz
4. Data Rate:	2400/2000/1200/1000, all synchronous.
5. Modulation:	2400 BPS or 2000 BPS quadrature-phase, 1200 BPS or 1000 BPS Di-phase.

2.02 Electrical Characteristics (Data & Control Signals)

1. Sense:

	Negative	Positive
Binary State	1	0
Signal Condition	Mark	Space
Function	Off	On

A negative is defined as a signal more negative than -3V measured at the interface. A positive is defined as a signal more positive than +3V measured at the interface.

2. Input Circuit Characteristics:

   a. Input Impedance: 3K to 7K ohms

   b. Open-Circuit Voltage: 2 volts maximum

   c. Shunt Capacitance: Less than 2500pf

3. Output Circuit Characteristics:

   a. Output Voltage: ±5 volts minimum

   b. Source Impedance: Greater than 300 ohms

   c. Short-Circuit Current: Less than 1/2 ampere damage proof

4. Fail-Safe Features:

   a. The power-off source impedance of all drivers is greater than 300 ohms.

   b. The input terminators interpret a power-off condition or the disconnection of the inter-connecting cable as an OFF condition, except for Pin 23 of EIA connector (CH) designation.

5. Request-to-Send/Clear-to-Send Delay: 5, 7.5, 20, 150 or zero milliseconds, normally strapped for 7.5 milliseconds.

6. Echo Suppressor Disabling Tone: 2025 Hz for 2.5 seconds.

7. Current Consumption:

+12V	22 milli-amps
-12V	22 milli-amps
+5V	160 milli-amps

2.03 Controls

2025 Hz Answer Tone normally set and sealed at factory.

2.04 Connector Interface

Circuit Description	CCITT V.24 Designation	EIA RS232C Designation	Pin Number
Signal Ground	Ckt. 102	AB	20,21,X,Y
Xmit Data (Input)	Ckt. 103	BA	13
Request to Send (Input)	Ckt. 105	CA	14
Rate Selector	Ckt. 111	CH	P
Clear to Send (Output)	Ckt. 106	CB	L
Data Set Ready (Output)	Ckt. 107	CC	11
Switch Hook Status	From Coupler		K
Data Terminal Ready	Ckt. 108.2	CD	T
Ring Indicator	From Coupler		S
Coupler Cut Thru	From Coupler		12
Serial Clock Xmit (SCT)	Ckt. 114	DB	U
Dibit Clock Xmit (DCT)	To DTE		17
Serial Clock Xmit External (SCTE)	Ckt. 113	DA	10
Off Hook	To Coupler		16
+12 volts			18, V
-12 volts			19, W
+5 volts			22, Z
600/900 Ohms Input/Output Balanced			4, 1

There are additional input and output points which are applicable when this board is used in conjunction with a Model 83PR board to generate an 883P stand-alone desk-top modem. These are listed below:

2.04 Connector Interface (cont'd)

Pin No.	Description
B	Receive Tone Line to 83PR Board for 2-wire application.
N	Echo Supp. Dis. Switch - A momentary ground at this point will activate the 2.5 sec. Echo Suppressor Disabling tone.
15	CF (TTL) - Forwards carrier detect to abort circuit. When using the 83PS board only, be sure to return this point to +5 volts or else transmitter will disconnect from data coupler after 10 seconds.
3	Auxiliary Input - Provides flexibility in adding VFTG channels outside the xmitter spectrum.
M	Inhibit CF - A positive TTL voltage to inhibit carrier-detect on the 83PR board when the phone is off hook in conjunction with a CBS DAA.
R	CA TTL - A TTL output indicating an EIA Request-to-Send input.

3.0 STRAP OPTIONS

3.01 Normal Strapping

The normal factory strapping is as follows:

83PS Board, straps: B1, B2, B3, B4, BC1, BC2, AB, D2, J, K1, M, S, U, V, Z, 1-2, 3-4, 5-6

With the above strapping, the mode of operation is as follows:

1. Modulation: 201B
2. Operation: 2-wire/Manual DAA
3. Clear-to-Send Delay: 7.5 milliseconds
4. Carrier: Under control of Request-to-Send
5. Impedance: 600 ohms
6. Transmit Level: -10 dbm

3.02 Restrapping Instructions

	83PS	
	Remove	Add
1. Modulation		
201B	------	------
201A	B1,B2,B3,B4 BC1,BC2	A1,A2,A3,A4,A5,A6
CCITT Alt. A	AB,B4	C1,C2
2. Operation		
2-wire/Manual DAA	------	------
2-wire/Automatic DAA (CBS 1001A)	M	L,P

3.02 Restrapping Instructions (cont'd)

	83PS	
	Remove	Add
3. Automatic Call Abort Feature (when used with 83PR board)		
(Automatic DAA only)		
Upon absence of carrier within 10 seconds after automatically answering	S	R
Upon absence of carrier within 10 seconds after automatically answering and loss of carrier thereafter	S,U	R,T
Neither of above	------	---
NOTE: Call will always be terminated by loss of Data-Terminal-Ready		
4. Clear-to-Send Delay		
7.5 milliseconds	------	---
No delay	------	H
5 milliseconds	Z	E
20 milliseconds	Z	Y
150 milliseconds	Z	G
5. Carrier		
Under Control of Request to Send	------	---
Always On	------	K
6. Impedance		
600 ohms	------	---
900 ohms	V	W

3.02 Restrapping Instructions (cont'd)

7. Transmit Level

The transmit level is normally strapped for -10 dbm into a 600 ohm load. The level can be changed in accordance with the following strapping table after removing Straps 1-2, 3-4, 5-6.

Desired Level

600 Ohms	900 Ohms	Straps
0 dbm	+2 dbm	None
-1 dbm	+1 dbm	1-3
-2 dbm	0 dbm	2-4
-3 dbm	-1 dbm	1-2, 4-5
-4 dbm	-2 dbm	1-3, 4-5
-5 dbm	-3 dbm	2-5
-6 dbm	-4 dbm	1-4, 4-5
-7 dbm	-5 dbm	1-2, 5-6
-8 dbm	-6 dbm	1-3, 5-6
-9 dbm	-7 dbm	3-4, 5-6
-10 dbm	-8 dbm	1-2, 3-4, 5-6
-11 dbm	-9 dbm	2-4, 5-6
-12 dbm	-10 dbm	1-4, 5-6
-13 dbm	-11 dbm	4-6
-14 dbm	-12 dbm	1-2, 4-6

For levels above 0 dbm, make strap F; this will raise the output level by 6 db.

600 Ohms	900 Ohms	Straps
+6 dbm	+8 dbm	None
+5 dbm	+7 dbm	1-3
+4 dbm	+6 dbm	2-4
+3 dbm	+5 dbm	1-2, 4-5
+2 dbm	+4 dbm	1-3, 4-5
+1 dbm	+3 dbm	2-5
+0 dbm	+2 dbm	1-4, 4-5

3.03 Data Terminal Ready (CD)

For the automatic answer mode of operation, data terminal ready is applied directly to this board. The terminal can apply CD before or after RI, it makes no difference. Data terminal ready is used to control OH & DA leads going to Data Coupler (1001A). The call will not be answered or will be aborted without CD.

3.04 Request-to-Send (CA) and Clear-to-Send (CB)

Upon application of Request-to-Send, Clear-to-Send is generated 7.5 milliseconds later. During this interval, steady mark is transmitted. The feature of mark lock-up until Clear-to-Send goes on, is controlled by strap D2. Removing this strap, restores transmitter data to the control of EIA input, (BA) Pin 13, the instant Request to Send goes on. The CA-CB time interval can be changed from 7.5 milliseconds in accordance with 3.02, para. 4.

Clear to Send appears in synchronization with a negative edge of DCT.

3.05 Two-Millisecond Delay

When Request-to-Send is turned off, the transmitter continues to send data for 2 milliseconds before squelching the carrier. This interval is necessary to allow data in the transmitter to be cleared.

3.06 Echo-Suppressor Disablement

For manual operation, the answer unit must disable the Echo Suppressors, This can be performed manually by connecting a push-button switch between Pin N and Common. Depressing the switch will create a 2.5 second burst of 2025 Hz which would disable any Echo Suppressors present on the line. The 2.5 second burst can be activated automatically by Coupler-Cut-Through when strapped for the CBS DAA.

3.07 Transmit Data (BA)

The Transmit Data must be synchronous and in time with SCT or SCTE. Data transitions are to be synchronous with positive edge of SCT or SCTE signal.

3.08 Data Set Ready (CC)

For Manual DAA, CC is off during the answer tone and during a 20 millisecond pause occuring immediately after the answer tone, and is also off during a test mode. CC is on at all other times. When strapped for an automatic DAA CC is also off in the absence of Coupler-Cut-Through (CCT).

4.0 INSTALLATION INSTRUCTIONS

4.01 Strapping

1. Determine desired options as described in Para. 3.02 and restrap is necessary.

2. Determine required transmit level and restrap if necessary per Para. 3.02. Normally, the Data Access Arrangement is marked with the signal input level required to obtain -12 dbm at the central office over the particular loop involved.

4.02 Mating Connector

1. The board can now be activated through a 44 pin connector (Amphenol 225-22221-101 or equivalent). The connections must be in accordance with the interface table per paragraph 2.04.

5.0 FUNCTIONAL DESCRIPTION

5.01 Theory of Operation (Block Diagram 83PS-02)

The incoming serial data stream (BA) is shifted into a register by a serial-to-parallel conversion. Each two adjacent bits (dibits) are examined and an 1800 Hz carrier (1750 Hz for the 201A mode) is differentially phase-shifted by an amount as indicated in Para. 6.01, page 883P-15. The signal spectral distribution is then shaped by a transmit filter, amplified and applied to the line through an isolation transformer.

The incoming data bit should change state at the positive transition of SCT, and the negative transition of SCT should coincide with the bit center. The modem clock can be synchronized to the data source clock, if desired, by applying an external clock at the bit rate to the SCTE input. The modem synchronizer circuitry will then force SCT to coincide with SCTE.

All control functions interface with EIA circuitry having fail-safe characteristics. The Answer Tone Generator is activated automatically in the automatic answer mode by receipt of Coupler-Cut-Through from the DAA or manually by activation of the rear button.

5.0 FUNCTIONAL DESCRIPTION

5.01 Theory of Operation (Block Diagram 83PS-02)

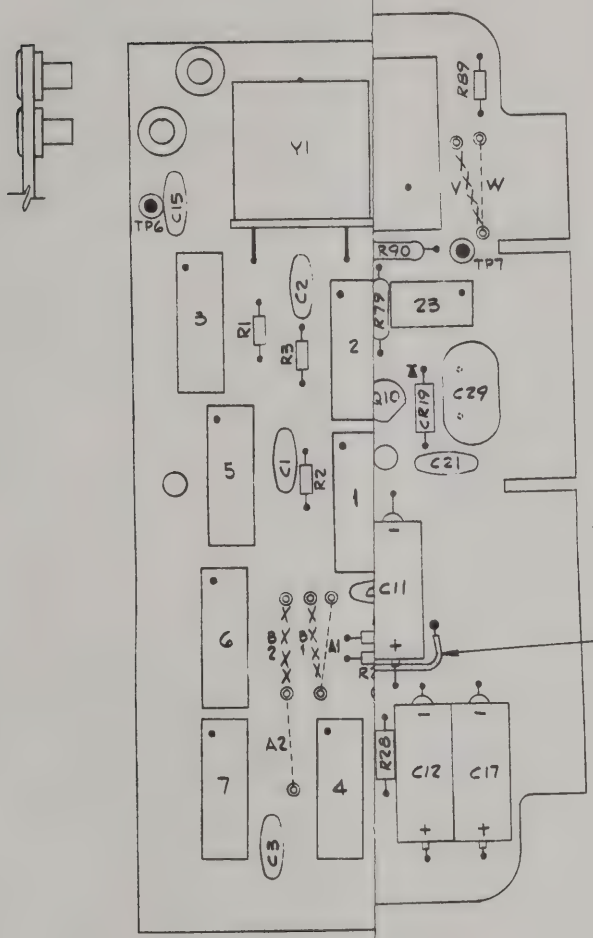
The incoming serial data stream (BA) is shifted into a register by a serial-to-parallel conversion. Each two adjacent bits (dibits) are examined and an 1800 Hz carrier (1750 Hz for the 201A mode) is differentially phase-shifted by an amount as indicated in Para. 6.01, page 883P-15. The signal spectral distribution is then shaped by a transmit filter, amplified and applied to the line through an isolation transformer.

The incoming data bit should change state at the positive transition of SCT, and the negative transition of SCT should coincide with the bit center. The modem clock can be synchronized to the data source clock, if desired, by applying an external clock at the bit rate to the SCTE input. The modem synchronizer circuitry will then force SCT to coincide with SCTE.

All control functions interface with EIA circuitry having fail-safe characteristics. The Answer Tone Generator is activated automatically in the automatic answer mode by receipt of Coupler-Cut-Through from the DAA or manually by activation of the rear button.

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	B	CR17 WAS CR7 ECN #1684	2-2-71	
	C	REPLACED R87 WITH JUMPER ECN 1782	12-13-71	
	D	REVISED PER ECN #1870 V.F	3-24-72	
A1	E	ADDED INACTIVE NOTE. ECN #2204	3-12-73	

24 AWG WITH SLEEVING



*30 AWG SOLID WIRE

* INACTIVE FOR NEW DESIGN – SEE A571T001. THIS DOCUMENT IS NOT SUPERSED FOR EXISTING APPLICATIONS.

PART OR IDENTIFYING NUMBER	SPECIFICATION	NOMENCLATURE OR DESCRIPTION	REMARKS

PARTS LIST

CIFIED
HES
NS ±

CONTRACT NO.

DATE		
PREPARED	S. Rei	6-7-71
CHECKED	A. Nolan	6-22-71
ENGINEER	V. Nixon	6-22-71
	MH	6-22-71

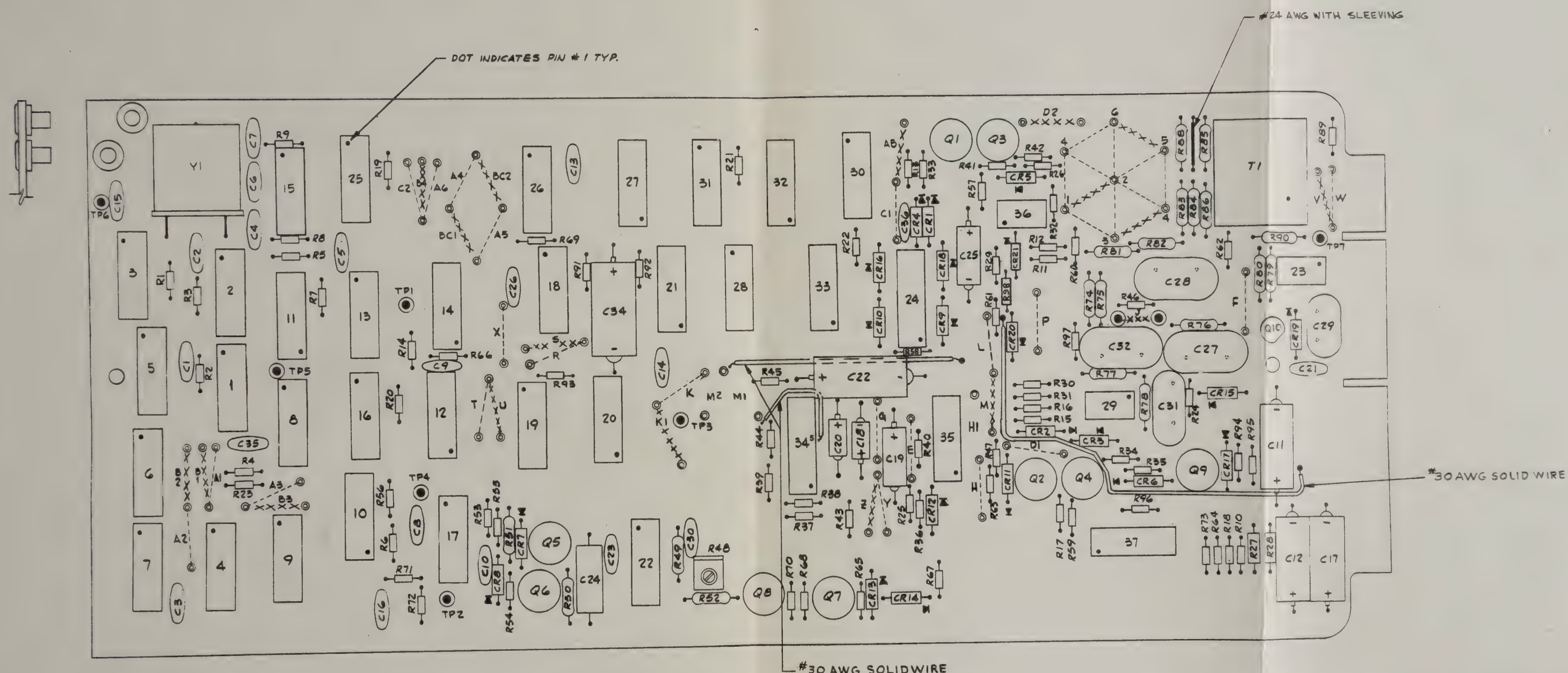
SINGER
TELE-SIGNAL CORPORATION
WOODBURY, N.Y.

ASSEMBLY
QUAD PHASE TRANSMITTER
MODEL 83PS

SIZE	CODE IDENT NO.	DRAWING NO.	REV
D	10241	83PS-08	E

SCALE 2:1 SHEET 1 of 1

ZONE	LTR	DESCRIPTION	DATE	APPROVED
	B	CR17 WAS CR 7 ECN #1684	[illegible]	[illegible]
	C	REPLACED R87 WITH JUMPER ECN 1782	12-13-71	[illegible]
	D	REVISED PER ECN #1870	3-24-72	[illegible]
A1	E	ADDED INACTIVE NOTE. ECN #2204	[illegible]	[illegible]



✱ INACTIVE FOR NEW DESIGN – SEE A571T001. THIS DOCUMENT IS NOT SUPERSED FOR EXISTING APPLICATIONS.

ITEM OR FIND NO.	QTY REQD	CODE IDENT NO.	PART OR IDENTIFYING NUMBER	SPECIFICATION	NOMENCLATURE OR DESCRIPTION	REMARKS

PARTS LIST

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCE ON FRACTIONS ±
ANGLES ±
3 PLACE DECIMALS ±
2 PLACE DECIMALS ±
MATERIAL:

CONTRACT NO.

DATE

PREPARED	[illegible]	6-7-71
CHECKED	[illegible]	6-22-71
ENGINEER	[illegible]	6-22-71
	[illegible]	[illegible]

SINGER
TELE-SIGNAL CORPORATION
WOODBURY, N.Y.

ASSEMBLY
QUAD PHASE TRANSMITTER
MODEL 83PS

SIZE	CODE IDENT NO.	DRAWING NO.	REV
D	10241	83PS-05	E

SCALE 2:1 SHEET 1 of 1

MODEL 83PR

MODEM

INSTRUCTION MANUAL

ISSUE III

SINGER

Tele-Signal
Electronic Products Division

250 Crossways Park Drive
Woodbury, L.I., N.Y. 11797
(516) 921-9400

OPERATING INSTRUCTIONS

To operate the receiver, perform the following steps:

1. After installation of a suitable antenna and connection of the receiver to the power line, turn the receiver "on" by rotating the VOLUME control knob to the right (clockwise). Allow a few minutes for warm-up.

2. Turn the VOLUME control knob to a well advanced position. This control will require resetting after a station has been tuned in.

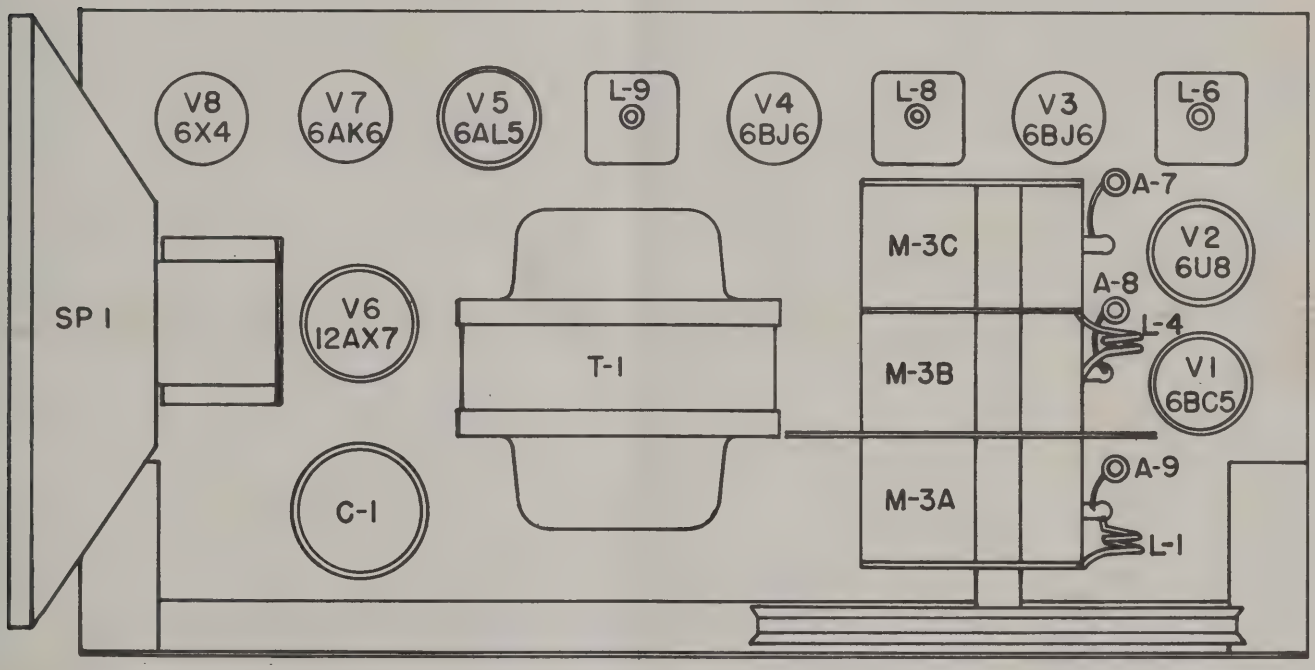
3. Rotate the SQUELCH control fully clockwise. This removes the squelch action.

4. Tune in the desired station by rotating the TUNING knob until the dial pointer indicates the station frequency. After the station has been located, the TUNING knob should be rotated back and forth until the point of loudest and clearest reception is found.

5. Set the VOLUME control for the desired colume.

6. To set the SQUELCH control properly, rotate the knob slowly in the counter-clockwise direction until noise just disappears. THIS MUST BE DONE BETWEEN STATION TRANSMISSIONS.

   NOTE: Always rotate the squelch control to the clockwise position before attempting to tune the receiver.



TUBE LOCATION DIAGRAM

RF AMP
V1-6BC5

MIXER AND OSC
V2-6U8

IF AMP
V3-6BJ6

IF AMP
V4-6BJ6

RATIO DET
V5-6AL5

RECT
V8-6X4

OUTPUT
V7-6AK6

AF AMP
V6B-12AX7

SQUELCH
V6A-12AX7

ANT

L1 A9 C37 4.7 A 1-6 B 1-6 C 1-6 L4 A8 A7

C4 27 -1.7V R3 1 MEG C5 5000 R4 220K R5 470K

100V L3 100V C6 1000 C7 510 C8 15 3V R7 100K R6 1K

175V 115V 80V 3 -5V C12 15 L5 C13 1000 C11 1000 C10 15 C9 510 R9 10K R8 10K R10 100K C21 5000 R11 470

10.7MC A5 A4 L6 C14 5000 R12 82

100V 0V 1V C16 5000 C15 5000 R13 470

10.7MC A3 A2 L8 C17 3300

100V 0V 1V C19 5000 C20 3300 C18 5000 R14 82 R15 470

10.7MC A1 A6 L9

-.3V C25 100 C24 100 R18 8.2 1W C22 1000 R17 68 R23 47K C23 330

R20 1.5K C3 2 MF R22 6.8K R19 1K R21 6.8K R24 47K

R2 25K SQUELCH VOL CONT R1 1 MEG C28 10000 C27 1000

L2 L7 L10 C38 5000

M3

T1 180 VAC 180 VAC 190V SW.(VOL. CONT.) X 6.3VAC Y

SPI T2 C34 5000

M1 TYPE 47 M2

185V 180V 8V 0V C35 1000 R35 270 1W C1A 40 MF C1B 20 MF C1C 20 MF R33 560 C32 10000 C33 270 R32 470K C36 20 MF

R16 2.7K-5W R25 47K C29 5000 R31 220K R34 33K R30 47K C31 .47 MF C2 2 MF R26 10K C30 1000 R27 560 R28 220K R29 2.2 MEG C26 10000

△ 75V ◒ 115V △ 23V ◒ 21V △ 18V ◒ 2V △ 22V ◒ 2.5V △ -.2V ◒ 1.1V

△ SQUELCH CONT. FULLY C.W.
◒ SQUELCH CONT. FULLY C.C.W.

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Turn volume and squelch controls fully clockwise.
Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting. To set pointer, turn tuning capacitor fully closed and set pointer to the extreme end of the low frequency end of dial.

IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO * DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
1.	.001MFD	High side to pin 2 (grid) of 6U8 (V2). Low side to chassis.	10.7MC	Point of non-interference	DC probe to point Ⓐ. Common to chassis.	A1, A2, A3, A4, A5	Adjust for maximum deflection.
2.	"	"	"	"	DC probe to point Ⓑ. Common to point Ⓒ.	A6	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
3.	.001MFD	High side to pin 2 (grid) of 6U8 (V2). Low side to chassis.	10.7MC (±200KC Swp)	Point of non-interference	Vert. Amp. to point Ⓐ. Low side to chassis.	A1, A2, A3, A4, A5	Disconnect stabilizing capacitor C3. Adjust for curve of maximum amplitude and symmetry similar to Fig. 1.
4.	"	"	"	"	Vert. Amp. to point Ⓑ. Low side to chassis.	A6	Reconnect capacitor C3. Adjust A6 for maximum straightness of diagonal line with 10.7MC marker appearing midway between peaks similar to Fig. 2.

RF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
5.	22Ω Carbon Resistor	High side to antenna terminal #1. Low side to terminal #2.	174	174	DC probe to point Ⓐ. Common to chassis.	A7	Adjust for maximum deflection.
6.	"	"	152	152	"	L5	Compress or expand for maximum deflection. Repeat steps 5 and 6.
7.	"	"	174	174	"	A8, A9	Adjust for maximum deflection.
8.	"	"	152	152	"	L1, L4	Compress or expand coils for maximum deflection. Repeat steps 7 and 8.

FIG. 1

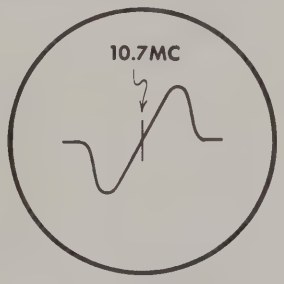


FIG. 2

RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	6BC5	1.2meg	0Ω	0Ω	.1Ω	*3.9K	*3.9K	0Ω		
V2	6U8	*10K	100K	*100K	.1Ω	0Ω	*750Ω	0Ω	0Ω	10K
V3	6BJ6	.6Ω	82Ω	0Ω	.1Ω	*3.4K	*3.4K	0Ω		
V4	6BJ6	.6Ω	82Ω	0Ω	.1Ω	*3.4K	*3.4K	0Ω		
V5	6AL5	INF.	INF.	0Ω	3Ω	■7.8K ▲26K	0Ω	■8.2K ▲26K		
V6	12AX7	*330K	■54K ▲70K	560Ω	.1Ω	.1Ω	*220K	2.4meg	10K	0Ω
V7	6AK6	470K	560Ω	0Ω	.1Ω	*330Ω	*270Ω	560Ω		
V8	6X4	90Ω	INF.	0Ω	.1Ω	INF.	85Ω	90K		

* MEASURED FROM PIN 7 OF V8.
■ SQUELCH CONTROL IN FULLY CLOCKWISE POSITION.
▲ SQUELCH CONTROL IN FULLY COUNTER-CLOCKWISE POSITION.

Proprietary Information

INSTRUCTION MANUAL

MODEL 83PR

INDEX

1.0 PURPOSE AND BASIC PRINCIPLES

1.01 Description

1. The 83PR is a four-phase-modulation synchronous receiver on a printed circuit board approximately 4 5/8" wide, 11" long and 5/8" high. A 44 pin connector (Amphenol 225-22221-101 or equivalent) is required for mating.

2. The unit is designed to be compatible with a Bell 201A, 201B type data set as well as CCITT 2400 BPS Alternate A & B. The receiver will operate synchronously at the following rates:

   2400 BPS
   2000 BPS
   1200 BPS
   1000 BPS

3. External power of +12 volts, -12 volts and +5 volts is required.

4. The unit contains a strappable compromise delay and slope equalizer and strappable Echo Delay (squelch).

5. New Sync feature causes fast synchronization when pulsed by the Data Terminal equipment.

1.02 Application

The unit is intended for use over the switched network and over conditioned lines at rates up to 2400 BPS. (Intended primarily to be compatible with 201A, 201B and CCITT Alternates A & B.) The unit may also be used at 1200/1000 baud synchronous speeds.

2.0 SPECIFICATIONS

2.01 Electrical Characteristics (VF Signals)

1. Input/Output Characteristics:	Transformer-coupled 2-wire half duplex or 4-wire line full duplex, 600 or 900 ohms ±5% strappable.
2. Input Level:	0 to -43dbm
3. Receive Sensitivity:	-38dbm fixed (2-wire) -43dbm fixed (4-wire)
4. Carrier Frequencies:	201A - 1750Hz 201B - 1800Hz CCITT V.26 - 1800Hz
5. Data Rate:	2400/2000/1200/1000 All synchronous
6. Modulation:	2400 BPS or 2000 BPS Quadrature Phase, 1200 BPS or 1000 BPS Di-Phase

2.02 Electrical Characteristics (Data & Control Signals)

1. Sense:

	Negative	Positive
Binary State	1	0
Signal Condition	Mark	Space
Function	Off	On

A negative is defined as a signal more negative than -3V measured at the interface. A positive is defined as a signal more positive than +3V measured at the interface.

2. Input Circuit Characteristics:

   a. Input Impedance: 3K to 7K ohms

   b. Open Circuit Voltage: 2 volts maximum

   c. Shunt Capacitance: Less than 2500pf

3. Output Circuit Characteristics:

   a. Output Voltage +5 volts minimum

   b. Source Impedance: Greater than 300 ohms

   c. Short circuit Current: Less than 1/2 ampere, damage-proof

4. Fail-Safe Features

   a. The power-off source impedance of all drivers is greater than 300 ohms.

   b. The input terminators interpret a power-off condition or the disconnection of the interconnecting cable as an OFF condition.

5. Squelch Feature:

   6, 15, 120 milliseconds, normally strapped for 120 milliseconds.

6. Carrier Detector:

   3-5 milliseconds ON delay
   2-5 milliseconds OFF delay

7. Power Consumption:

   +12V 90 milliamps
   -12V 90 milliamps
   +5V 30 milliamps

2.03 Controls

All controls are factory preset and sealed and should not be tampered with.

2.04 Connector Interface

Circuit Description	CCITT V.24 Designation	EIA RS232C Designation	Pin Number
Signal Ground	Ckt. 102	AB	20,21,X,Y
Received Data	Ckt. 104	BB	B
Receive Clock (SCR)	Ckt. 115	DD	1
Receive Dibit Clock (DCR)			A
Carrier Detect	Ckt. 109	CF	C
New Sync.			P
Switch Hook Status			L
Data Set Ready	Ckt. 107	CC	17
Data Tip DT1			16
Data Ring DR1			14
+12V			18,V
-12V			19,W
+5V			22,Z

There are additional input and output points which are mainly applicable when this board is used in conjunction with a Model 83PS board to generate an 883P stand-alone desk-top modem. These are listed below:

Pin No.	Description
15	Receive Tone Line - input from 83PS board in two-wire mode.
N	To Lamp - connects to low side of lamp (high side is connected to -12V).
M	Lamp Control - From carrier detect.
2	Baud Rate Switch - Pos. EIA or no connection forces full rate. Neg. EIA forces half rate.

2.04 Connector Interface (cont'd)

Pin No.	Description
R	Carrier Detect - TTL logic level.
U	2MA-From 83PS Board - activates squelch in 2-wire mode.
13	CA - Request to Send.
K	BB Lock Release - ground on this pin prevents loss of carrier detect when strapped for no home copy, in back-to-back mode.
T	Inhibit CF - Positive EIA will lock up carrier detect circuitry.

3.0 STRAPPING FEATURES

3.01 Normal Strapping

The normal factory strapping is as follows:

83PR Board, straps: A2B3, A3B4, B1, B2C1, D, FF, H, J, L, P, Q, S, T, U, W, Y, ZZ

With the above strapping, the mode of operation is as follows:

1. Modulation: 201B
2. Operation: 2 wire/Manual DAA
3. Impedance: 600 ohms
4. Lamp Driver: On for Loss of Receive Carrier
5. Compromise Equalizer: Strapped out
6. Serial Clock Receive: Space Lockup for loss of receive carrier

3.02 Restrapping Instructions

	83PR	
	Remove	Add
1. Modulation		
201B	------	---
201A	B1,B2C1,Q, S,T,U,W,Y	A1,R,X,Z
CCITT Alt. A	A2B3, A3B4, Q,W	C2,C3,R,X
2. Operation		
4 Wire/Manual DAA	------	---
2 Wire/Manual DAA	J	K
2 Wire/Automatic DAA (CBS 1001A)	J	K

3.02 Restrapping Instructions (cont'd)

	83PR	
	Remove	Add
3. Receive Data Squelch		
(2-wire operation only)		
6 milliseconds	FF	M,EE
15 milliseconds	FF	M,DD
120 milliseconds	------	M
4. Home Copy		
(2-wire operation only)		
Yes	------	---
No	------	GG
5. Lamp		
On for Loss of Carrier	------	---
On for Carrier Detect	H	G
6. Compromise Equalizer		
No Equalization	------	---
Compromise Dial Up	P	NN
Nominal C2	P	N
Worst-Case C2	P	---
7. Serial Clock Receive		
Space Lock-up for Loss of Received Carrier	------	---
Mark Lock-up for Loss of Received Carrier	ZZ	YY

4.0 INSTALLATION INSTRUCTIONS

4.01 Strapping

Determine mode of operation and restrap in accordance with Paragraphs 3.01 and 3.02.

4.02 Mating Connector

The board can now be activated through a 44 pin connector (Amphenol 225-22221-101 or equivalent). The connections must be in accordance with the interface table per Paragraph 2.04.

5.0 FUNCTIONAL DESCRIPTION

5.01 Theory of Operation (Figure 83PR-02)

The incoming phase-modulated signal is filtered to minimize the effects of impulse and random noise incurred over the telephone system and to shape the signal spectrum in order to obtain the optimum raised-cosine spectral density.

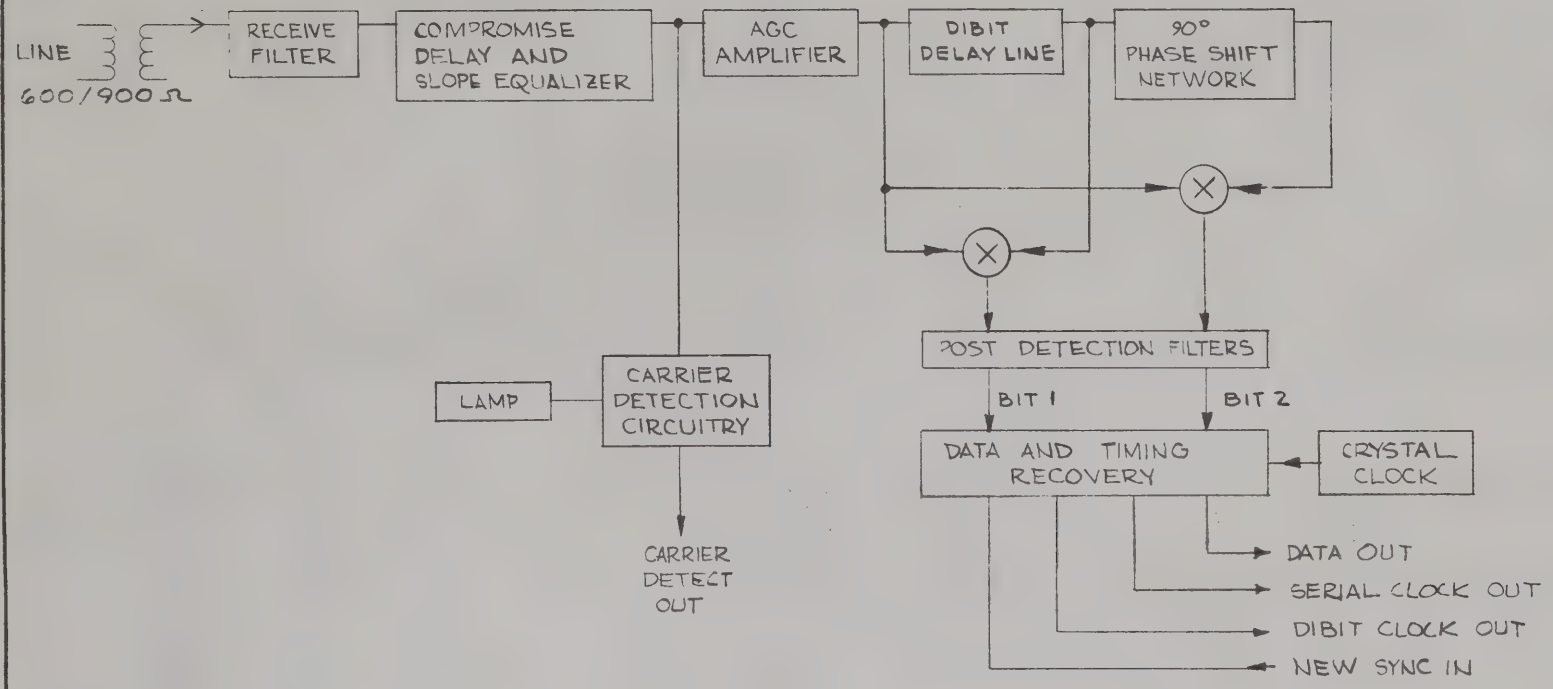
The carrier detection circuitry determines the presence or absence of received carrier and drives an external lamp, if present.

A delay and slope equalizer then compensates for the slope and delay distortion of the communications link. The AGC amplifier equalizes for the net loss of the channel.

The signal is delayed one dibit time interval and product-modulated with the newly arrived signal. Simultaneously, the delayed signal, phase-shifted by 90°, is product-modulated with the newly arrived signal. Upon filtering the product modulator outputs, the dibits are restored. Both bits are then center-sampled and parallel-to-serial shifted to restore the serial data stream.

The timing recovery circuitry determines the optimum sampling instant and supplies received clock to the data terminal equipment.

A ORIGINAL SYMBOL	REVISIONS		
ZONE LTR	DESCRIPTION	DATE	APPROVED



ITEM OR FIND NO.	QTY REQD	CODE IDENT NO.	PART OR IDENTIFYING NUMBER	SPECIFICATION	NOMENCLATURE OR DESCRIPTION	REMARKS
PARTS LIST						

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOL ON FRACTIONS ±
ANGLES ±
3 PLACE DECIMALS ±
2 PLACE DECIMALS ±

MATERIAL:

CONTRACT NO
DATE

PREPARED	Baucaus	3-22-71
CHECKED	DR	6-1-71
ENGINEER	[illegible]	6-1-71

NEXT ASSY | USED ON

APPLICATION

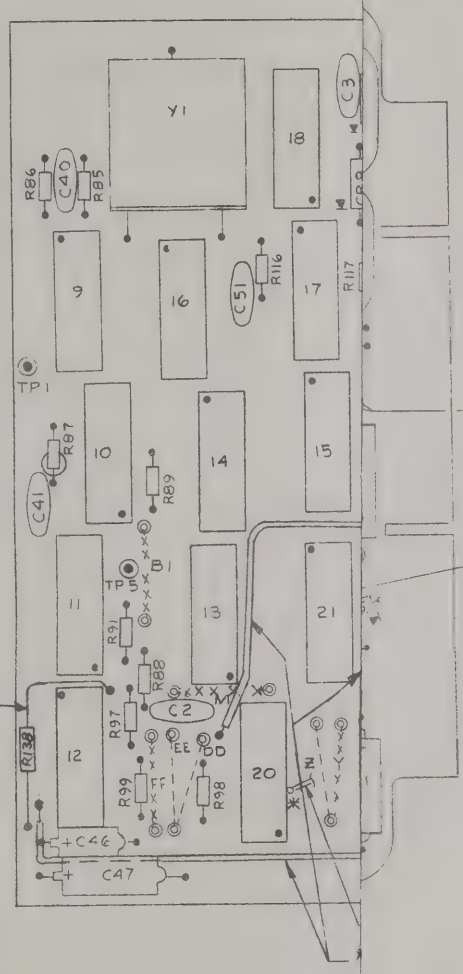
SINGER
TELE-SIGNAL CORPORATION
WOODBURY, N.Y.

BLOCK DIAGRAM
MODEL 83PR

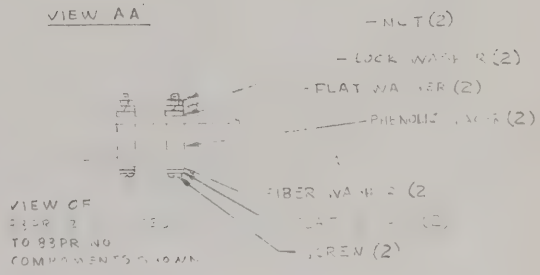
SIZE	CODE IDENT NO.	DRAWING NO.	REV
B	10241	83PR-02	A

SCALE | SHEET 1 OF 1

ORIGINAL SYMBOL ZONE	LTR	REVISIONS DESCRIPTION	DATE	APPROVED
	B	ADDED NOTE 1. ECN # [illegible]		
	C	REMOVED C11, C12 & R93. ADDED 3 JUMPERS. RELOCATED STRAP 'F' ECN # 1703		
		ADDED DETAIL-A & NOTE 2. ECN 1752		
	D	R1 WAS 20Ω, 3W. R2 WAS 22Ω, 3W. VR1 & VR2 RELOCATED & WERE IN5343B. R175, R176 & NOTE 2 DELETED R177 & 179 WERE 4.3K. REVISED DETAIL "A" ECN # 1854	2-25-72	
	E	REVISED PER ECN # 1870 VF		
	F	CHANGE PER ECN #1883		
	G	CHANGED PER ECN # 2086		
	H	REVISED PER ECN #2151		
	J	ADDED INACTIVE NOTE ECN #2204	3-2-73	



VIEW AA



VIEW OF [illegible] TO 83PR NO COMPONENTS SHOWN.

#24 AWG WITH PLASTIC SLEEVINGS.

NOTES:
1. R1 & R2 ARE TO BE RAISED UP OFF THE BOARD 1/16.
2. THE FOLLOWING COMPONENTS ARE [illegible] TO BE ASSEMBLED ON UNITS AFTER SERIAL NO. 182.
   RESISTORS R29, [illegible]
   CAPACITOR, C22, 23 [illegible] 25
   DIODES CR6.
3. R26, 27, 123, 174 & CR25 TO BE MAX [illegible] BOARD (SEE DETAIL 'B')
4. * TO CONNECT USING #30 AWG SOLID W[illegible] AND TIE TO HARNESS

[illegible] - SEE A568T001.
[illegible]ERSEDED FOR

[illegible] SEE SEPARATE PARTS LIST

RT OR IDENTIFYING NUMBER	SPECIFICATION	NOMENCLATURE OR DESCRIPTION	REMARKS

PARTS LIST

[illegible]FIED
[illegible]S
[illegible]S

CONTRACT NO

DATE

PREPARED	F. McCLEAN	5-11-71
CHECKED	[illegible]	[illegible]
ENGINEER	[illegible]	[illegible]

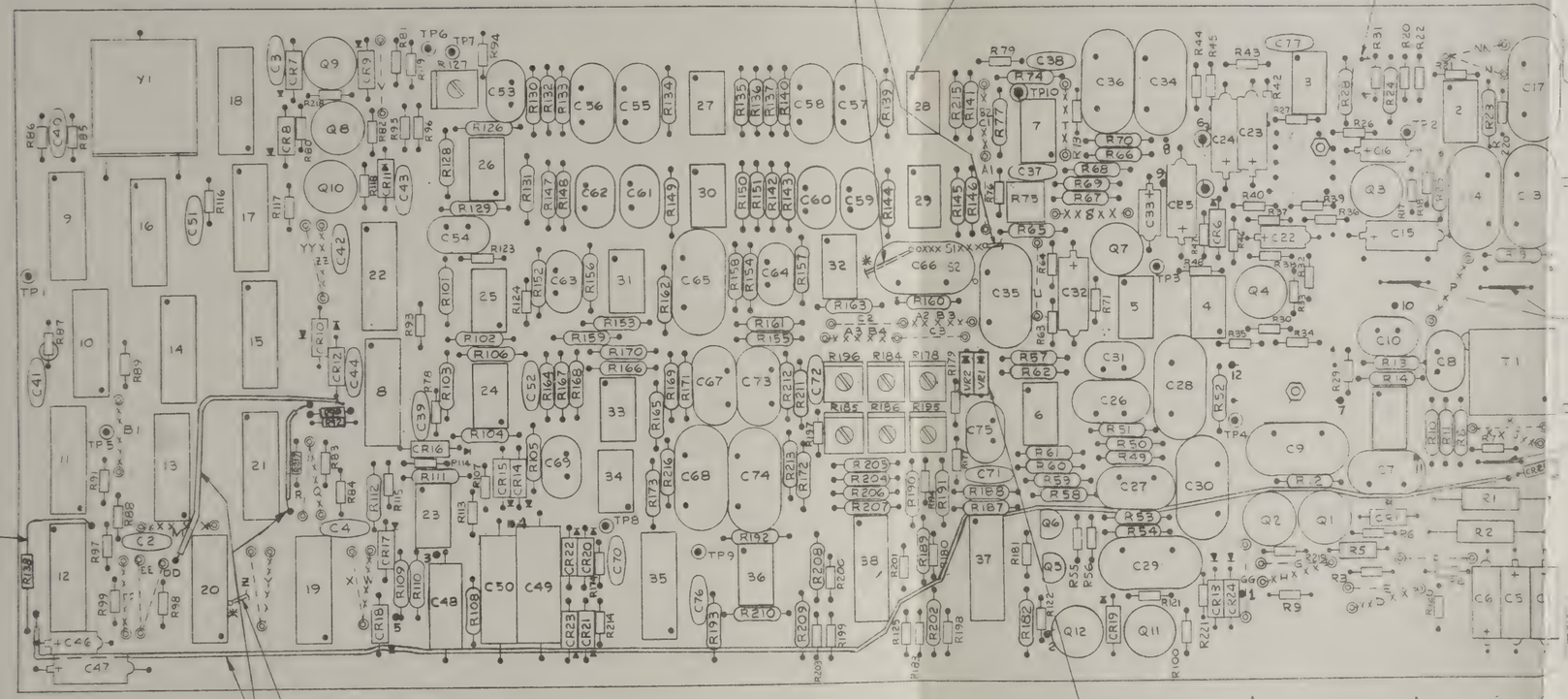
SINGER
TELE-SIGNAL CORPORATION
WOODBURY, N.Y.

ASSEMBLY
QUAD PHASE RECEIVER
MODEL 83PR(A)

SIZE	CODE IDENT NO.	DRAWING NO	REV
D	10241	83PR-08	

SCALE ~ SHEET [illegible] OF [illegible]

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	C	ADDED NOTE 2. ECN 1752		
	D	REMOVED CR1, CR2 & R79. RELOCATED STRAP F ECN # 1705 ADDED DETAIL A & NOTE 2. ECN 1752 R1 WAS 20Ω, 5W., R2 WAS 22Ω, 5W., VR1 & VR2 RELOCATED & WERE IN5343B. R175, R176 & NOTE 2 DELETED R177 & 179 WERE 4.5K. REVISED DETAIL "A" ECN # 1854	11-17-71 SP 2-28-72	
	E	REVISED PER ECN # 1970	JF	
	F	CHANGE [illegible] ECN # 2065		
	G	CHANGED PER ECN # 2086		
	H	REVISED PER ECN # 2151	RC	1-15-73
	J	ADDED INACTIVE NOTE ECN # 2204	RC	3-[illegible]-73



DETAIL "A"
TYPICAL MOUNTING OF VR1 & VR2

1/16 MAX

.250 MAX

DETAIL B"
TYPICAL MOUNTING OF R26, 27, 123, 124 & CR25

NOTES:
1. R1 & R2 ARE TO BE RAISED UP OFF THE BOARD 1/16.
2. THE FOLLOWING COMPONENTS ARE NOT TO BE ASSEMBLED ON UNITS AFTER SERIAL NO. 82
   RESISTORS R24, 30, 32 THRU 40, 42 THRU 5
   CAPACITOR, C22, 23, 24, 25
   DIODES CR6
3. R26, 27, 123, 124 & CR25 TO BE MAX BOARD (SEE DETAIL B)
4. * TO CONNECT USING # 30 AWG SOLID W. E. AND TIE TO HARNESS

* INACTIVE FOR NEW DESIGN - SEE A568TC01.
THIS DOCUMENT IS NOT SUPERSEDED FOR EXISTING APPLICATIONS

SEE SEPARATE PARTS LIST

ITEM OR FIND NO	QTY REQD	CODE IDENT NO	PART OR IDENTIFYING NUMBER	SPECIFICATION	NOMENCLATURE OR DESCRIPTION	REMARKS

PARTS LIST

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCE ON FRACTIONS ±
ANGLES ±
3 PLACE DECIMALS ±
2 PLACE DECIMALS ±

MATERIAL:

CONTRACT NO

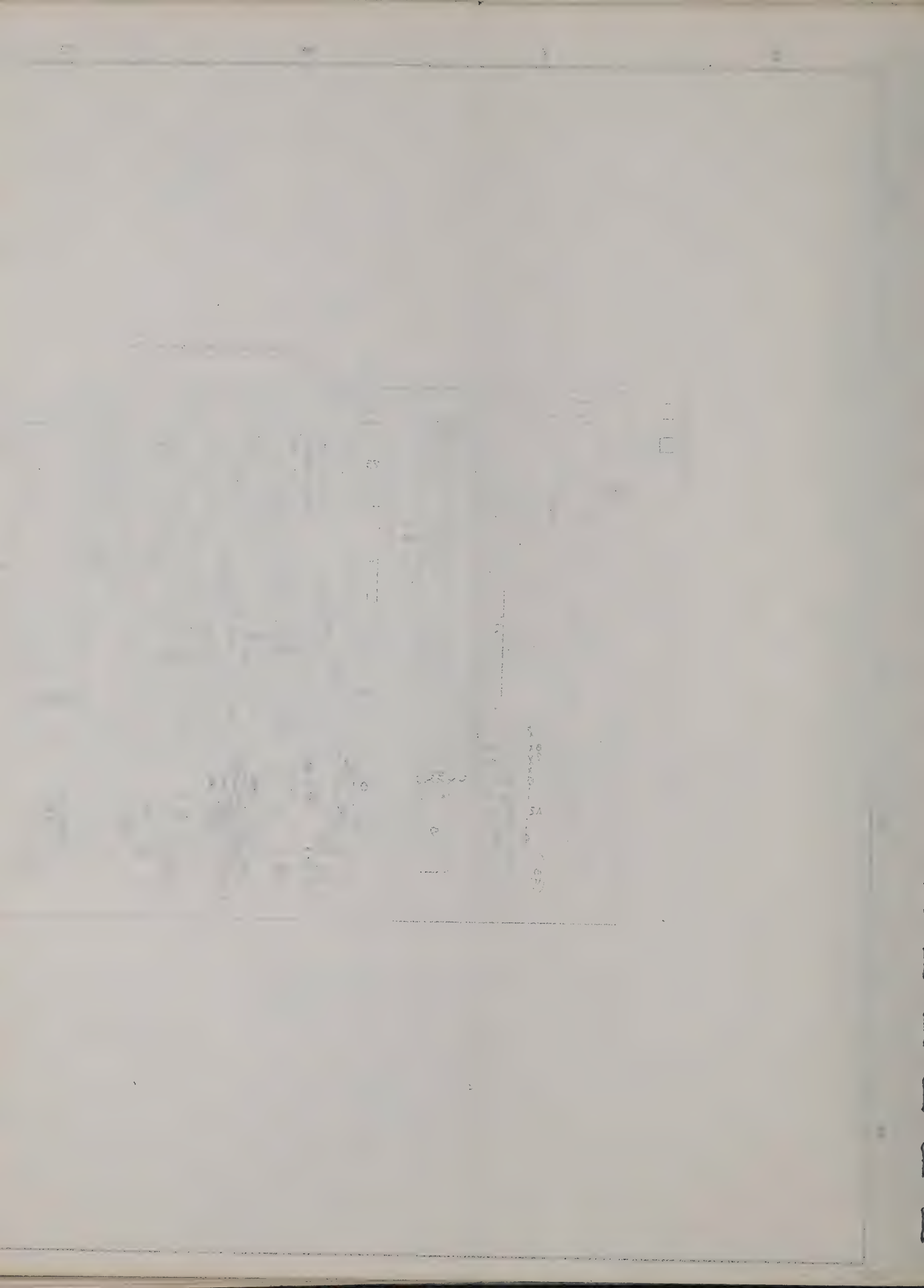
DRAWN
TRACED
ISSUED
ENGINEER

SINGER
TELE-SIGNAL CORPORATION
WOODBURY, N.Y.

ASSEMBLY
SOLID PHASE MODULAR
[illegible] CONTROL

SIZE	CODE IDENT NO	DRAWING NO	REV
D	10241	83PR-[illegible]	T

SCALE [illegible] SHEET [illegible]



Part Number	FSCM	Symbol	Description
		MAJOR COMPONENTS	
83PR	10241	A2	Quad-Phase Receiver Board
83PS	10241	A1	Quad-Phase Transmitter Board
		CHASSIS COMPONENTS	
39D228G025HP4	56289	C1,2	Cap. Elect. 2200MF
TCR10001	10241	CR1	Bridge, Rectifier
53	08806	DS1	Lamp
313.125	75912	F1	Fuse 1/8 amp Slo-Blow
TXM3113100	10241	J4	Connector, 25 pin female
TXS1221B22	10241	J1,2	Connector P.C.
1-309/3	70903	P1	Cord, Line with 3 Cdr. Plug
TRCC4711	10241	R1,2	Res. Comp 470 ohms ±10% ¼W
242E1005	56289	R3	Res. W/W 10 ohms ±5% 3W
TRCC3921	10241	R4	Res. Comp 3.9K ohms ±10% ¼W
TSR030252F	10241	S3	Switch, Rotary 10 Pole, 3 Pos.
SS-31	78488	S1	Switch, Slide, Single Pole, 3 Pos.
MSP105F	95146	S2	Switch SPDT Black Knob Momentary Pushbutton
XF10046	10241	T1	Transformer Power
410-Y-14	75382	TB1	Strip, Barrier 14 Pos.
LM309K	27014	VR1	Voltage Regulator
7-87	95263	XDS1	Lamp Holder
MK-15	04713	XVR1	Socket, Volt. Reg.

Note: FSCM: Federal Supply Code to Manufacturers

SINGER
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ELECTRICAL PARTS LIST

DATA MODEM
MODEL 883P

DWN 6-17-71
CKD
ENG

MAJOR AND CHASSIS COMPONENTS

SHEET 1 OF 1

DWG SIZE A

REV C

Part No.	FSCM	Symbol	Description
IC53A	10241	8,22,35	Dual Linear Amp
IC55A	10241	1-7, 23-34, 36	Dual Linear Amp
IC74L00A	10241	13,20	Quad Two Input Pos NAND Gates
IC74L04A	10241	9	Hex Inverters
IC74L10A	10241	17	Triple Three Input Pos. NAND Gates
IC74L51A	10241	21	Dual AND-OR Invert Gates
IC74L73A	10241	10,11,14, 18	Dual J-K Master Slave Flip-Flop
IC74L74A	10241	15,19	Dual D Type Edge Trig. Flip-Flop
IC74L93A	10241	16	Four Bit BINARY Counter
IC74121A	10241	12	Monostable Multivibrators
MC1495L	10241	37,38	Four Quad Multiplier
JF150±10%	91418	C77	Cap. Disc. 150PF ±10% 1000V
JF100±10%	91418	C51	Cap. Disc. 100PF ±10% 1000V
JF220±10%	91418	C42,43,44, 41,70,76	Cap. Disc. 220PF ±10% 1000V
JF001±10%	91418	C40	Cap. Disc. .001MF ±10% 1000V
TA01+80-20%	91418	C37,39	Cap. Disc. .01MF+80-20% 100V
M12-.1-20%	91418	C2,3,4,18,38, [illegible], 52,71,72	Cap. Magna .1MF ±20% 12V
DM-10-151-G	72136	C31	Cap. Mica 150PF ±2% 500V
DM-10-221-G	72136	C69,75	Cap. Mica 220PF ±2% 200V
DM-10-391-F	72136	C59-64	Cap. Mica 390PF ±1% 100V
DM-10-391-G	72136	C8,10,54	Cap. Mica 390PF ±2% 100V
DM-10-391-J	72136	C53	Cap. Mica 390PF ±5% 100V
DM-15-601-G	72136	C27	Cap. Mica 600PF ±2% 300V
DM-15-861-G	72136	C26,67,73	Cap. Mica 860PF ±2% 300V

Part No.	FSCM	Symbol	Description
DM-15-961-G	72136	C7	Cap. Mica 960PF ±2% 100V
DM-15-102-G	72136	C55-58	Cap. Mica 1000PF ±2% 100V
DM-19-132-G	72136	C68,74	Cap. Mica 1300PF ±2% 500V
DM-19-152-F	72136	C66	Cap. Mica 1500PF ±1% 500V
DM-19-152-G	72136	C28,29, 30	Cap. Mica 1500PF ±2% 500V
DM-19-232-G	72136	C9	Cap. Mica 2300PF ±2% 500V
DM-19-252-G	72136	C14,17	Cap. Mica 2500MF ±2% 500V
DM-19-2621-F	72136	C35,36	Cap. Mica 2620PF ±1% 500V
DM-19-502-G	72136	C13,65	Cap. Mica 500PF ±2% 500V
DM-19-5251-F	72136	C34	Cap. Mica 5250PF ±1% 300V
TCP2681II2	10241	C50	Cap. Poly .00268MF ±2% 200V
TCM1802IB2	10241	C48	Cap. Prec. Mylar .018MF ±2% 200V
TCM3832IC2	10241	C49	Cap. Prec Mylar .0383MF ±2% 200V
TCT105K1SG	10241	C22	Cap. Tant 1MF ±10% 50V
TCT225K1SE	10241	C46	Cap. Tant 2.2MF ±10% 20V
TCT335K1SD	10241	C16,33	Cap. Tant 3.3MF ±10% 15V
TCT685K2SF	10241	C25	Cap. Tant 6.8MF ±10% 35V
TCT106K2SE	10241	C23,32,47	Cap. Tant 10MF ±10% 20V
TCT226K2SD	10241	C24	Cap. Tant 22MF ±10% 10V
TCT396K2SC	10241	C1,5,6,15	Cap. Tant 39MF ±10% 10V
IN277	93332	CR14,15,18,20, 22,24	Diode
IN456A	93332	CR6-13,19,25, 21,23,17,24	Diode

Part No.	FSCM	Symbol	Description
1N4009	04713	CR16	Diode
2N3638A	07263	Q1,2,10	Transistor
2N3643	07263	Q3,4,7,8,9 11,12	Transistor
2N5459	04713	Q5,6	Transistor
TRCB1501	10241	R64	Res. Comp 15 ohms ± 10% 1/8W
TRCB2201	10241	R39	Res. Comp 22 ohms ± 10% 1/8W
TRCB5601	10241	R63	Res. Comp 56 ohms ± 10% 1/8W
TRCB3015	10241	R3	Res. Comp 300 ohms ± 5% 1/8W
TRCB4711	10241	R94,95,96 119	Res. Comp 470 ohms ± 10% 1/8W
TRCB1021	10241	R4,9,17,35, 177,179	Res. Comp 1K ohms, ± 10% 1/8W
TRCB1125	10241	R107	Res. Comp 1.1K ohms ± 5% 1/8W
TRCB1221	10241	R87,187	Res. Comp 1.2K ohms ± 10% 1/8W
TRCB5611	10241	R7	Res. Comp 560 ohms ± 10% 1/8W
TRCB1821	10241	R36	Res. Comp 1.8K ohms ± 10% 1/8W
TRCB2425	10241	R116	Res. Comp 2.4K ohms ± 5% 1/8W
TRCB3025	10241	R47,76	Res. Comp 3K ohms ± 5% 1/8W
TRCB3321	10241	R34,37,122	Res. Comp 3.3K ohms ± 10% 1/8W
TRCB4325	10241	R40,113	Res. Comp 4.3K ohms ± 5% 1/8W
TRCB4721	10241	R6,33,55,56, 85,86,88,125, 138,198,199, 219	Res. Comp 4.7K ohms ± 10% 1/8W
TRCB5125	10241	R20	Res. Comp 5.1K ohms ± 5% 1/8W
TRCB6225	10241	R29,31,81, 120,221	Res. Comp 6.2K ohms ± 5% 1/8W
TRCB3921	10241	R99	Res. Comp 3.9K ohms ± 10% 1/8W

Part No.	FSCM	Symbol	Description
TRCB8221	10241	R46,180,181, 200,201	Res. Comp 8.2K ohms ±10% 1/8W
TRCB1031	10241	R30,42,43,71, 80,214,115, 174,18	Res. Comp 10K ohms ±10% 1/8W
TRCB1135	10241	R79	Res. Comp 11K ohms ±5% 1/8W
TRCB1231	10241	R38	Res. Comp 12K ohms ±10% 1/8W
TRCB1531	10241	R97,183,203	Res. Comp 15K ohms ±10% 1/8W
TRCB1635	10241	R93	Res. Comp 16K ohms ±5% 1/8W
TRCB1831	10241	R118	Res. Comp 18K ohms ±10% 1/8W
TRCB2035	10241	R114	Res. Comp 20K ohms ±5% 1/8W
TRCB2231	10241	R83	Res. Comp 22K ohms ±10% 1/8W
TRCB2731	10241	R32,44,82	Res. Comp 27K ohms ±10% 1/8W
TRCB3331	10241	R218	Res. Comp 33K ohms ±10% 1/8W
TRCB5135	10241	R220	Res. Comp 51K ohms ±5% 1/8W
TRCB3635	10241	R92	Res. Comp 36K ohms ±5% 1/8W
TRCB3931	10241	R98	Res. Comp 39K ohms ±10% 1/8W
TRCB4731	10241	R84,89,91,117, 121,100 217,	Res. Comp 47K ohms ±10% 1/8W
TRCB4335	10241	R22	Res. Comp 43K ohms ±5% 1/8W
TRCB9135	10241	R21	Res. Comp 91K ohms ±5% 1/8W
TRCB1041	10241	R78,90	Res. Comp 100K ohms ±10% 1/8W
TRCB1841	10241	R73	Res. Comp 180K ohms ±10% 1/8W
TRCB3341	10241	R48	Res. Comp 330K ohms ±10% 1/8W
TRCB6841	10241	R45,194,197	Res. Comp 680K ohms ±10% 1/8W
TRCC1001	10241	R5	Res. Comp 10 ohms ±10% ¼W
TRCE4701	10241	R1,R2	Res. Comp 47 ohms 1/2W 10%

Part No.	FSCM	Symbol	Description
RN55D5360F	81349	R103,104	Res. Prec. 536 ohms ±1% 1/8W
RN55D1211F	81349	R204	Res. Prec. 1.21K ohms ± 1% 1/8W
RN55D1501F	81349	R189,205 206,188	Res. Prec. 1.5K ohms ± 1% 1/8W
RN55D3011F	81349	R112,191,207 124	Res. Prec. 3.01K ohms ± 1% 1/8W
RN55D4121F	81349	R145	Res. Prec. 4.12K ohms ± 1% 1/8W
RN55D4991F	81349	R24,26 57-61 136	Res. Prec. 4.99K ohms ± 1% 1/8W
RN55D5761F	81349	R135	Res. Prec. 5.76K ohms ± 1% 1/8W
RN55D7501F	81349	R111	Res. Prec. 7.5K ohms ± 1% 1/8W
RN55D1002F	81349	R62,74,77,105,106,126 128,129,131,133,140, 143,146,148,151,152,154, 156,157,158,160,162,163, thru 171	Res. Prec. 10K ohms ± 1% 1/8W
RN55D1052F	81349	R150	Res. Prec. 10.5K ohms ± 1% 1/8W
RN55D1372F	81349	R182,202	Res. Prec. 13.7K ohms ± 1% 1/8W
RN55D1652F	81349	R137	Res. Prec. 16.5K ohms ± 1% 1/8W
RN55D1742F	81349	R52	Res. Prec. 17.4K ohms ± 1% 1/8W
RN55D2002F	81349	R141	Res. Prec. 20K ohms ± 1% 1/8W
RN55D2322F	81349	R215	Res. Prec. 23.2K ohms ± 1% 1/8W
RN55D1872F	81349	R25	Res. Prec. 18.7K ohms ± 1% 1/8W
RN55D3012F	81349	R66,190,193, 208,209	Res. Prec. 30.1K ohms ± 1% 1/8W
RN55D3652F	81349	R12,13,14	Res. Prec. 36.5K ohms ± 1% 1/8W
RN55D3742F	81349	R19,23	Res. Prec. 37.4K ohms ± 1% 1/8W
RN55D4422F	81349	R53	Res. Prec. 44.2K ohms ± 1% 1/8W
RN55D5232F	81349	R132	Res. Prec. 52.3K ohms ± 1% 1/8W
RN55D6342F	81349	R8,10,11	Res. Prec. 63.4K ohms ± 1% 1/8W

Part No.	FSCM	Symbol	Description
RN55D6042F	81349	R67,68	Res. Prec. 60.4K ohms ± 1% 1/8W
RN55D7322F	81349	R147	Res. Prec. 73.2K ohms ± 1% 1/8W
RN55D7682F	81349	R155	Res. Prec. 76.8K ohms ± 1% 1/8W
RN55D1003F	81349	R108,109 110,142	Res. Prec. 100K ohms ± 1% 1/8W
RN55D1183F	81349	R134	Res. Prec. 118K ohms ± 1% 1/8W
RN55D1503F	81349	R49,50,51, 65	Res. Prec. 150K ohms ± 1% 1/8W
RN55D1543F	81349	R139	Res. Prec. 154K ohms ± 1% 1/8W
RN55D1653F	81349	R144	Res. Prec. 165K ohms ± 1% 1/8W
RN55D1823F	81349	R102	Res. Prec. 182K ohms ± 1% 1/8W
RN55D2323F	81349	R161	Res. Prec. 232K ohms ± 1% 1/8W
RN55D2743F	81349	R159	Res. Prec. 274K ohms ± 1% 1/8W
RN55D2873F	81349	R130	Res. Prec. 287K ohms ± 1% 1/8W
RN55D3013F	81349	R54,69,70,149,153, 172,173,192,210, 211,212,213, 216	Res. Prec. 301K ohms ± 1% 1/8W
RN55D1371F	81349	R123	Res. Prec. 1.37K ohms ± 1% 1/8W
RN55D4021F	81349	R27	Res. Prec. 4.02K ohms ± 1% 1/8W
RN55D4641F	81349	R101	Res. Prec. 4.64K ohms ± 1% 1/8W
RN55D4222F	81349	R28	Res. Prec. 42.2K ohms ± 1% 1/8W
ZV1031	01121	R178,184,185, 186,195,196	Res. Vari. 10K ohms
ZV5031	01121	R75	Res. Vari. 50K ohms
ZV1041	01121	R127	Res. Vari. 100K ohms
XA10035	10241	T1	Transformer
1N5221	04713	VR1,2	Diode Zener
XL10012-5	10241	Y1	Crystal, 1536.00KC

NOTE: FSCM - Federal Supply Code to Manufacturers

Part No.	FSCM	Symbol	Description
IC53A	10241	17,22	Dual Linear Amp
IC55A	10241	23,29,36	Dual Linear Amp
IC74L00A	10241	13,20,27,37	Quad Two Input Pos. NAND Gates
IC74L02A	10241	2,14	Quad Two Input Pos. NOR Gates
IC74L04A	10241	1,11,12	Hex Inverters
IC74L10A	10241	4,19,26,33	Triple Three Input Pos NAND Gates
IC74L20A	10241	28	Dual Four Input Pos. NAND Gates
IC74L51A	10241	16	Dual AND-OR-INVERT Gates
IC74L73A	10241	3,6-10,15	Dual J-K Master Slave Flip-Flop
IC74L74A	10241	18,25,30, 31,32,35	Dual D-Type Edge Trig. Flip-Flop
IC74L93A	10241	5	Four Bit Binary Counters
IC74121A	10241	21	Monstable Multivibrators
IC74123A	10241	24,34	Dual Retriggerable Monstable
C6N750±10%	91418	C23	Cap. Disc. 6PF ±10% 1000V
C25N750±10%	91418	C30	Cap. Disc. 25PF ±10% 1000V
JF82±10%	91418	C8,10	Cap. Disc. 82PF ±10% 1000V
JF100±10%	91418	C6,7	Cap. Disc. 100PF ±10% 1000V
JF220±10%	91418	C35	Cap. Disc. 220PF ±10% 1000V
JF680±10%	91418	C3	Cap. Disc.680PF ±10% 1000V
JF001±10%	91418	C1,4,5	Cap. Disc. .001MF ±10% 1000V
TA01+80-20%	91418	C21	Cap. Disc. .01MF+80-20% 100V
JF680±10%	91418	C2	Cap. Disc. 680PF ±10% 1000V
M-12-.1±20%	91418	C13-16,26, 36	Cap. Magnacap .1MF ±20% 12V
TCM1002SA2	10241	C24	Cap. Prec. Mylar .01MF ±1% 200V
DM15-681-G	72136	C29	Cap. Mica 680PF ±2% 500V

Part No.	FSCM	Symbol	Description
DM-19-152-G	72136	C31,32	Cap. Mica 1500PF ±2% 500V
DM19-262-G	72136	C28	Cap. Mica 2600PF ±2% 500V
DM19-3781-G	72136	C27	Cap. Mica 3780PF ±2% 500V
JF470±10%	91418	C9	Cap. Disc. 470PF ±10% 1000V
TCT105K1SG	10241	C20	Cap. Tant 1MF ±10% 50V
TCT225K1SE	10241	C18	Cap. Tant 2.2MF ±10% 20V
TCT106K2SE	10241	C19,25	Cap. Tant 10MF ±10% 20V
TCT226K2SD	10241	C11,12	Cap. Tant 22MF ±10% 15V
TCT396K2SC	10241	C17	Cap. Tant 39MF ±10% 10V
TCT337K4SB	10241	C22,34	Cap. Tant 330MF ±10% 6V
IN456A	93332	CR1-6,8,10,11, 13-21,9	Diode
IN277	93332	CR12	Diode
IN4009	04713	CR7	Diode
2N3643	07263	Q1-9	Transistor
2N5134	07263	Q10	Transistor
TRCB1511	10241	R4	Res. Comp 150 ohms ±10% 1/8W
TRCB1811	10241	R10	Res. Comp 180 ohms ±10% 1/8W
TRCB3615	10241	R3,5,8,9, 14,23	Res. Comp 360 ohms ±5% 1/8W
TRCB4711	10241	R18,29,61, 73	Res. Comp 470 ohms ±10% 1/8W
TRCB8211	10241	R7	Res. Comp 820 ohms ±10% 1/8W
TRCB1221	10241	R32,96	Res. Comp 1.2K ±10% 1/8W
TRCB2221	10241	R24	Res. Comp 2.2K ±10% 1/8W
TRCB4325	10241	R89	Res. Comp 4.3K ohms ±5% 1/8W
TRCB4721	10241	R1,2,36, 54,55	Res. Comp 4.7K ohms ±10% 1/8W

Part No.	FSCM	Symbol	Description
TRCB5621	10241	R43,57	Res. Comp 5.6K ohms ±10% 1/8W
TRCB6225	10241	R11,15,30,34, 64,67,95,46	Res. Comp 6.2K ohms ±5% 1/8W
TRCB7525	10241	R21	Res. Comp 7.5K ohms ±5% 1/8W
TRCB8221	10241	R25	Res. Comp 8.2K ohms ±10% 1/8W
TRCB1031	10241	R53,62,63, 98	Res. Comp 10K ohms ±10% 1/8W
TRCB1231	10241	R44,69,37	Res. Comp 12K ohms ±10% 1/8W
TRCB1531	10241	R58,91	Res. Comp 15K ohms ±10% 1/8W
TRCB1635	10241	R42,60,72	Res. Comp 16K ohms ±5% 1/8W
TRCB2435	10241	R45,92	Res. Comp 24K ohms ±5% 1/8W
TRCB2731	10241	R16	Res. Comp 27K ohms ±10% 1/8W
TRCB3635	10241	R26,41,71	Res. Comp 36K ohms ±5% 1/8W
TRCB4731	10241	R6,12,13,17,19, 20,22,31,33,35, 40,47,56,66,68, 70,93,59,94, 97,65,39	Res. Comp 47K ohms ±10% 1/8W
TRCB1541	10241	R38	Res. Comp 150K ohms ±10% 1/8W
TRCC2201	10241	R27,28	Res. Comp 22 ohms ±10% ¼W
ZV5021	01121	R48	Res. Vari. 5K ohms ±10%
RN55D2002F	81349	R74,75,76	Res. Prec. 20K ohms ±1% 1/8W
RN55D5110F	81349	R86,88	Res. Prec. 511 ohms ±1% 1/8W
RN55D4871F	81349	R81	Res. Prec. 4.87K ohms ±1% 1/8W
RN55D4991F	81349	R50	Res. Prec. 4.99K ohms ±1% 1/8W
RN55D9761F	81349	R82	Res. Prec. 9.76K ohms ±1% 1/8W
RN55D1002F	81349	R49,51	Res. Prec. 10K ohms ±1% 1/8W
RN55D1962F	81349	R83	Res. Prec. 19.6K ohms ±1% 1/8W

Part No.	FSCM	Symbol	Description
RN55D3922F	81349	R84	Res. Prec. 39.2K ohms ±1% 1/8W
RN55D5622F	81349	R52	Res. Prec. 56.2K ohms ±1% 1/8W
RN55D7872F	81349	R85	Res. Prec. 78.7K ohms ±1% 1/8W
RN55D1333F	81349	R79,80,90	Res. Prec. 133K ohms ±1% 1/8W
RN55D1503F	81349	R77	Res. Prec. 150K ohms ±1% 1/8W
RN55D3013F	81349	R78	Res. Prec. 301K ohms ±1% 1/8W
XA10034	10241	T1	Transformer
XL10012-6	10241	Y1	Crystal, 1008.00KC

SINGER
TELE-SIGNAL CORPORATION
WOODBURY, N.Y.

ELECTRICAL PARTS LIST
QUAD-PHASE TRANSMITTER
MODEL 83PS

DWN 6-18-71
CKD
ENG

SHEET 4 OF 4

DWG SIZE A

REV C